The role of environmental legislation in promoting sustainable mining in the Democratic Republic of Congo: A study of the Katanga Copper Belt

Frank Nkulu Mulunda Banze

Supervisor:

By

Professor Mulala Danny Simatele

A thesis submitted to the University of the Witwatersrand, Johannesburg in fulfilment of the requirements for the degree of Doctor of Philosophy in the Department of Geography and Environmental Studies.

Johannesburg, 2019

DECLARATION

I hereby declare that this thesis, "The role of environmental legislation in (promoting) sustainable mining in the democratic republic of Congo: A study of the Katanga copper belt", is my own unaided, original work and that all quoted sources have been accurately reported and acknowledged. The thesis is submitted in fulfilment of the Degree of Doctor of Philosophy, Department of Geography and Environmental Studies at the University of Witwatersrand, Johannesburg. It has not been submitted for any degree or examination at this or any other University.

DEDICATION

I dedicate this thesis to:

My late parents Jean Paul Banze Mutumibwa and Albertine Kasongo Shimbi;

My wife Christelle Kalonda Kabamba;

My brothers and sisters;

To Moshel Françoise Nkulu Mulunda;

To Emmanuel Banze Mutumibwa

ACKNOWLEDGEMENTS

While conducting this research has been pleasant and informative, the process has also been tough, frightening, burdensome and (financially, psychologically and physically) exasperating. Completion of this research would have been a next-to-impossible mission had it not been for the support from the following:

- I thank God Almighty for guidance, protection and provision through this seemingly impossible journey from my first law degree up to my PhD studies;

- My special thank and gratitude go to my supervisor Professor Mulala D Simatele who has been with me and accessible for consultation during this PhD expedition. Thank you for your guidance and kindness showed to me throughout the journey of my PhD;

- My special gratitude to the University of the Witwatersrand Merit Award scholarships that have made it possible for me to study and complete a PhD degree;

- I can never forget Ms Carol Crossly who assisted me with financial support at a time when everything seems impossible. Thank you for giving me hope;

- Many thanks to my brothers and sisters for their financial and moral support.

- I would like to thank all my friends who in one way or another (editing, proofreading…) have contributed to the successful completion of the thesis;

ABSTRACT

The study investigates the effectiveness of environmental legislation in protecting the environment and local community development in the Katanga Copper Belt. In answering the research questions, the study used qualitative research methods for data collection and understands the phenomenon of environmental degradation and community poverty.

The study argues that environmental legislation is an important tool for environmental management aimed at reducing the impact of anthropogenic activities on the environment, protecting the natural resources and local communities. Nevertheless, environmental policies must be followed by the strong institution's framework and the collaboration of mining stakeholders to ensure that the policies put in place to protect the environment are not only developed but are effectively implemented for the promotion of sustainable mining practice.

In the study of the case of the Katanga Copper Belt, the study found that, in spite of environmental and mining policies which capture the concept of sustainable development and emphasised the protection of the environment and the socio-economic development of the local community. There is a glaring failure of services of state who do not properly exercise their mission of implementation, monitoring and evaluation. Furthermore, there is no concrete socio-economic development plan for the communities in the Katanga Copper Belt. In addition, there is no indication that the various provincial government sanctions the non-compliance by mining operators of their operations contained in the specification, “yet required by the legislator to protect the environment and to boost the socio-economic development of the local entities within the framework of the protection and equitable redistribution of national wealth advocated by article 58 of the Constitution of the Democratic Republic of the Congo.

In order to improve the implementation of environmental legislation in the mining sector of the Katanga Copper Belt for the promotion of sustainable mining practice, the study recommends a systematic management approach of institution and mining sector based on Knowledge dissemination, capacity building, transparency, enforced compliance and dissemination of obligation and right of all mining stakeholders.

Keywords: Environmental legislation, mining, sustainable mining, sustainable development environmental management, community development and Katanga Copper Belt.

TABLE OF CONTENTS

LIST OF ACRONYMS

1. DRC: Democratic Republic of Congo
2. UNDP: United Nations Development Programmes
3. UNCD: United Nations Conference on desertification
4. UN: United Nations
5. ICMM: International Council on Mining and Metals
6. MMCD : Master Municipal Construction Documents Association
7. WSSD: World Summit on Sustainable Development
8. DESA: Department of Economic and Social Affairs
9. WBCSD: World Business Council for Sustainable Development
10. GRI: Global Reporting Initiative
11. IFRS: International Financial Reporting Standard
12. GAAP: General Acceptable Accounting Principles
13. CEPA: Canadian Environmental Protection Act
14. MAC: Mining Association of Canada
15. TSM: Sustainable Mining od Canada
16. EIA: Environmental Impacts Assessments
17. WMS: Water Management System
18. ILO: International Labour Organisation
19. KPMG: Klynveld Peat Marwick Goerdele
20. IEM: Integrated Environmental Management

21. DEAT: Ministry of Environmental Affairs and Tourism

22. NEMA: National Environmental Act

23. MPRDA: Mineral and Petroleum Resources Development Act

24. DEA: Department of Environmental Affairs

25. SHE: Safety Environment and Health

26. EMP : Environmental Management Programmes

27. IFC : International Finance Corporation

28. GCM : Générales des Carrières et des Mines

29. KCC : Kamoto copper mines

30. Sicomines : Sino-Congolaise des Mines

31. CSR : Corporate Social Responsibility

32. UMHK : Union Minier du Haut Katanga

33. CSK : Comite Spécial du Katanga

34. MPR : Mouvement Populaire de la Révolution

35. ZER : Zone Exclusive de Recherche

36. EIC : Etat Independent du Congo

37. KZI: Kolwezi

38. LSHI: Lubumbashi

39. NGO: Non-Government Organisation

40. MECNND: The Ministry of the Environment, Nature Conservation and Sustainable Development

41. ACE : A g e n c e Congolaise de l'Environnement

42. ICCN : Institut Congolaise de Conservation de la Nature

43. CPE : Coordination Provincial de l'Environnement

44. CUE : C o o r d i n a t i o n Urbaine de l'environnement

45. EIDD : Environmental and Social Impact Diagnose

46. ESIA : Environmental & Social Impact Assessment

47. ESMP : Environmental and Social Management Plans

48. PMCES : Environnemental and Social Compliance Plans

49. DPEM : Direction de Protection de l'environnement Minier

50. DGRAD : Direction Générale de Recette administrative et Domanial

51. DGI : Direction General des Import

52. ACIDH : action Contre l'Impunité pour le Droit, Humain

53. STL : Société de Terril de Lubumbashi

LIST OF FIGURES

LIST OF TABLES

CHAPTER ONE

THE FRAME OF REFERENCE

1.1 Background to the study

The mining industry remains an important sector in many countries (i.e. South Africa, Botswana, Zimbabwe, Zambia, Ghana, Democratic Republic of Congo, United States of America, Canada, and Australia). It is central to development set to bring about social and economic transformation (Andrea, 2004; Asante, 2016; Aykut and Goldstein, 2007; Odenthal, 2001; Page and Velde, 2004). Many African countries that have abundant mineral resources have anchored their economy around the mining sector. According to Botin (2009); Bridge (2008) and Eggert (2006), this industry plays a significant role in establishing social and economic infrastructures that contribute to the creation of secondary industries and sustainable cities such as Johannesburg, Colorado, Ontario and Ndola. However, according to Ferraz (2012), in many cases, this fixation on the mining industry has led to instances whereby the entire economy of a country is dependent on the mining sector. Consequently, when the mining sector is in crisis the country's economy becomes significantly impacted and the Democratic Republic of Congo (DRC) is an example of such a country (Tsurukawa, Prakash and Manhart, 2011).

According to available evidence, the DRC is classified as the world's main producer of cobalt and the fifth most significant producer of copper. The mining and mineral processing sectors have contributed significantly to the economy of the DRC (Scheele, DeHaan and Kiezebrink, 2016). Mining activities in DRC, just like many mining activities in Africa, are conducted in areas where there are weak institutional frameworks, and no effective policies, thus resulting in severe implications for the quality of the environment (Cowell, Wehrmeyer, Argust and Robertson, 1999). Mining activities which are conducted in an irresponsible manner can lead to environmental degradation, displaced populations, inequality and other challenges (UNDP, 2016).

1.2 Thematic considerations of the study

Mining activities in the DRC are the backbone of social and economic development. However, political instability, weak governance and policies have rendered such developments insignificant (de Failly, Ntakobajira and Shonja, 2013). Therefore, this study aimed to understand how legislation in the DRC can be used to promote mining activities that will facilitate effective environmental management and sustainable development.

According to Brundland (1987) defined sustainable development as '…development that meets the needs of the present without compromising the ability of future generations to meet their own needs'. In this regard, this study looked at this concept of sustainable development as an attempt to merge environmental problems with socio-economic problems (Hilson, 2012; Runhaarr and Lafferty, 2009). This definition is favourable because it places local communities and human needs at the centre of development, and thus improves the well-being of local communities in a given physical environment (Moran, Lodhia, Kunz and Huisingh, 2014a). Hence, Todorov and Marinova (2009) stressed that this approach to sustainable development is focused on the conceptual framework that describes the interaction between pairs of humanity-economy-nature, as well as their interrelation.

Giddings, Hopwood and O'Brien (2002) argue that to achieve sustainable development, there should be an equal focus on the economy, society and the environment but this is seldom the case as more weight is usually given to economic growth leaving the other pillars of sustainable development neglected. Available evidence suggests that economic growth and economic sustainability seem to receive more attention over the depletion of natural resources and the compromise of societal benefits (Giddings *et al.* 2002). Hence, in line with Botin (2009); Dovers (1996) and Eggert (2006), the present study focused on environmental legislation which is an essential tool in the sustainable management of natural resources and the environment for the promotion of sustainable mining practices because of its impartial nature.

In the context of this study, the assumption is that environmental legislation must be flexible and easy to apply. Available evidence states that most environmental policies are designed to meet the needs of each stakeholder (Tan and Faúndez, 2017; Hopwood *et al.*, 2005; Zaelke, Hunter and Salzman, 1998). However, it has been noted that policy formulation approaches have the ability to paralyse the implementation process as conflicts arise over

the interpretation of theories and policies (Hopwood *et al.*, 2005). From this perspective, therefore, it could be assumed that an inclusive approach to policy formulation takes care of these misunderstandings in interpretations (Long and Simatele, 2017).

As a result of a different approach to policy formulation, policy-making tends to favour those in power rather than protect the poor from mining operations. In this regard, Young (2011) posits that, where the rich and those in power tend to dominate the agenda, policy formulation is in their favour. Therefore, the present study investigated the environmental legislation applicable to mining activities for the protection of the environment and community development. The study also investigated the institutional and structural provision and approaches in the implementation, monitoring and evaluation of environmental legislation in the mining sector (Govindan *et al*., 2014 and Sadler, 2012). These steps constitute the practical approach towards promoting sustainable mining practices.

It is alleged that the mining industry is a major contributor to environmental degradation worldwide and even more so in developing countries (Gudmundsson *et al*., 2016; Campbell, 2009 and Eggert, 2006, 2001). In this regard, therefore, the major challenges globally are to establish a sustainable mining industry (Moran, Lodhia, Kunz and Huisingh, 2014). Sustainable mining is a concept that has gained momentum in development studies as a result of global concerns about the environmental risks of industrialisation and resource depletion (Eggert, 2006, 2001; Ferraz, 2012). These ideologies according to Laurence (2011) stem from the prevailing view that economic growth and ecological or environmental values are incompatible because common practice favours economic growth over environmental well-being. Consequently, the international community has gathered on different occasions to put in place international regulations to establish a system for the sustainable management of mineral resources (Stockholm, 1972; Rio, 1987). Thus, this system would take into account maintaining the quality of the environment, economic growth and the well-being of the people (Pearce *et al*., 2013). Furthermore, according to Hilson and Basu (2003), it is argued that it was necessary for the mining sector to introduce the concept of sustainable development in order to cope with the impacts of the depletion of mineral resources and the environmental risks caused by these mining activities. From this understanding and according to Ali *et al*., (2017) and Will *et al*., (2015), sustainable mining can be achieved if the current rate of mineral use does not exceed the ability to find new sources, acceptable

substitutes or recycling of the already extracted natural resources. It is further argued that the mining sector should change its approach by adopting social, environmental and economic concerns (James (1999). In recent years, sustainable mining has been referring to as 'Responsible Mining" due to the fact that mining activities which involve the extraction of natural's resources can cause long-lasting social and environmental impacts (Kirsch, 2009; Whitmore, 2006; Power 2002; Young and Septoff, 2002). Therefore, according to Onn and Woodley (2014) "establishing the corporate level sustainability goals is a fundamental early step in mining contribution to sustainable mining". Goodland (2012) provides two main reasons which have led the mining to become more responsible which are: first; the destructive impacts caused by mining to the local communities and the environment. Second; responsible mining can offer mining companies greater and faster revenue with no struggles with immediate communities and with fewer bearings than irresponsible mining (Kirsch, 2014 and Filer, 2011).

In which case then, according to Laurence (2011) and Eggert (2006) sustainable mining should be contextualised in the form of environmental quality, economic growth and social justice. Thus, according to Laurence (2011), sustainable mining practices should be safe, demonstrate best practices in environmental management and community engagement, be economically sound and use mineral resources effectively.

In keeping with the sustainable development goals or vision 2030, the DRC has amended its Constitution and the Mining Code by introducing the concept of sustainable development (DRC, 2014 Check for proper reference). Subsequently, the DRC has also adopted the Fundamental Environmental Legislation of 2011 which provide a framework for sustainable environmental management of any activities to affect the environment (DRC Constitution of 2006). However, according to Kubanza, and Simatele (2017); Kubanza and Simatele (2016) and Kamundala (2012), the challenge in the DRC is the efficient administration of Environmental Legislation in the mining sector for future sustainability. Due to these issues, this study focuses on trying to understand how environmental legislation promotes sustainable mining in the Katanga Copper Belt and ensure effective environmental management.

1.3 Rational

According to Ascher (1999), Bechtel and Tosun (2009), in the last two decades many developing countries have adopted remarkable environmental legislation with the intention to protect the environment and improve the quality of life. However, their actual impact on the quality of the environment is affected by poor governance, lack of qualified human resources and financial resources for monitoring and evaluation (Aklin *et al.*, (2014); Wood (2013). Nevertheless, regardless of the fact that corrupt officials allow bribes, individuals companies who pollute or destroy the environment benefit from the avoidance of fines by not changing their practices or behaviour (Hu *et al*., 2004; Asproudis 2011).

Tsurukawa *et al*., (2011); KPMG, (2014) and Kamundala (2012) note that while mining legislation that includes environmental legislation applicable to mining activities have been updated to include the concept of sustainable development and attract foreign direct investment, the natural environment continues to be negatively affected and polluted by mining (big, medium, small and artisanal) operating in the Katanga copper belt. Furthermore, the centre for International Conflict Resolution and the United Nations Development Program (2009) report on the DRC stressed that in the province of Katanga, most development projects are undertaken by mining companies and this approach has become the principal scheme in the effort to develop the Congolese state. Furthermore, the report highlights the danger of using this approach is that though mining companies may be able to provide assistance whilst they are still in operation but once operations stop financing development projects they are likely to stop. In the same way, Mthembu-Salter (2009) points to the fact that during the mining boom in Kolwezi (Katanga), the state has in certain forms abandoned its responsibility to provide basic services to the population. Thus, Honke (2010) stressed that private mining companies have taken over employment provision as well as carrying out a limited number of functions concerned with controlling natural recourses. Such forms of assistance mask the shortcomings in the government's capacity to implement environmental legislation that will help the state to promote sustainable mining and achieve economic growth, national development and create jobs.

According to Corrigan (2014) and Akitoby (2004), the mining industry in the Democratic Republic of Congo is the largest contributor of the gross development product (GDP) however; the mining sector is affected by:

- Lack of coordination and efficient state management;
- Failure to improve the lives of local communities;
- Poor implementation of environmental legislation for the management of the mining environment.

This study is therefore interested in how ineffective environmental legislation leads to poverty and environmental degradation, whilst on the other hand how mining can help the Democratic Republic of Congo achieve sustainable development.

1.4 Research questions

The literature review on mining, sustainable development, sustainable mining practice and environmental legislation, described in detail in Chapter Two of the study, serves to assemble the theoretical foundations for structuring research questions. Therefore, this thesis aims to answer the following questions:

(i) In what ways does the current environmental legislation in the Katanga copper belt promote sustainable mining and environmental stewardship?
(ii) In what ways does the current mining practice in the Katanga copper belt promote community well-being and sustainability?
(iii) What challenges exist in fostering stakeholder engagement in the mining community of the Katanga copper belt?
(iv) What legal or legislative framework exists within which to promote sustainable mining?

1.5 Aims and objectives of the research

The aim of this study was to investigate and established whether environmental legislation can influence sustainable practices and thinking within the mining industry in the DRC. In view of this, the objectives of the study were to:

(i) Identify ways in which environmental legislation promotes sustainable mining practices;
(ii) Identify ways in which sustainable mining practice and the well-being of the local

community can be promoted;

(iii) Identify ways in which different stakeholder engagement, collaboration and participation of mining communities could be fostered;

(iv) Create an inventory of ways in which to develop an enabling legal system and framework work that promotes and facilitates mining stakeholder's environmental legislation compliance particularly mining companies.

1.6 Literature Review

According to Waas *et al.*, (2011), the debate around sustainable development has evolved from "new alternative development to a development model endorsed by widely recognised and formal policy. Nowadays, the concept of sustainable development is understood as an attempt to merge environmental problems with socio-economic problems (Hopwood, Mellor and O'Brien, 2005; Waas *et al.*, 2011). In this regard, therefore, issues on mining, minerals and sustainability are a focal point of present debate (Bridge, 2004; Cowell *et al.*, 1999). Furthermore, sustainable mining is contextualised by some authors as environmental quality, economic growth, and social justice (Schure, 2011; Laurence, 2011; Botin, 2009 and Eggert, 2006).

Rajaram *et al.*, (2005), argues that the limited life span of mining activities alone is reason enough for this industry to consider sustainable practices because it will eventually come to an end. Furthermore, the mining industry is divided over the type and approach of sustainable development to adopt. Giurco *et al*., (2012) argue that the division on the sustainable development practice to adopt in mining activities is caused by varied stakeholder interests and values.

Golusin (2009) brings into context the simple proportional relationship between the economic development of a given country and the proportionate destruction of natural resources. As a result, Plaizier *et al*., (2000) note that sustainability was seen as a prerequisite for obtaining a license in order to calm the threats of Non-Governmental Organisations (NGOs) and progressive governments that were perceived as related to operational performance. Hence, Hopwood *et al.*, (2005) argue that environmental legislation has an important role to play because environmental policies are designed to meet the needs of each stakeholder.

According to Wang (1999) and Kiss (1994), historically the concept of environmental legislation focusing on environmental management dates as far back as the 18th century. This period coincided with the period when countries such as France and Finland enacted their early environmental legislation to improve natural resources conservation. Similar developments were also recorded in the United State of America where the increase in nature conservation in the 1870s led to the creation of national parks and forest protection laws (Campbell, 1993). Furthermore, Mayda (1984) noted that environmental legislation is a useful and practical tool for resource management and economic assistance. Furthermore, Mayda (1984) note that sometimes environmental regulation does not adequately address the needs of an individual country, and therefore become an obstacle to the development of citizens rather than a useful instrument for environmental management. Hence, McGarity (2004) argues that the goals of all environmental laws should be to protect and enhance the human environment. Therefore, the regulatory objectives of environmental management programs could be divided into two main groups such as acceptable risks and the reduction of pollution (McGarity, 2004). The complexity and fragmented nature of environmental legislation as highlighted by McGarity can create problems for application, analysis and implementation (Scotford and Robinson, 2013). Furthermore, Scotford *et al*., (2013) stressed that the practical implications of environmental legislation depend not only on the structure of regulatory powers but also on the way regulators choose to exercise their discretion under the law.

The detailed discussion on the different arguments around the role of environmental legislation in promoting sustainable environmental management vis-à-vis sustainable mining is captured in Chapter 2.

1.7 Summary of some methodological considerations

The methodological approach adopted for this study was mostly qualitative. However, the use of qualitative and quantitative methods of data collection is crucial for the study in order to develop accurate descriptions and analysis of the role of environmental legislation in promoting sustainable mining.

The qualitative methodology of the study relied on the possibilities of using several research methods and data sources to understand a specific phenomenon such as the role of environmental legislation in the mining sector, as well as to understand the regulatory,

administrative approach of environmental legislation in the mining sector through interactions with informants who are well vested in the administration and implementation processes, including those affected or concerned by the phenomenon of sustainable mining practices (Philip 1998, Creswell and Creswell, 2017 and Creswell, 2009). The study examines the role of environmental legislation in promoting sustainable mining. The Katanga Copper Belt has been used as a study area to carefully examine a contemporary phenomenon of development practices in a specific context (Zainal, 2007).

The Katanga Copper Belt was chosen as a study area because of its economic importance for the DRC and local communities around the mines. On the one hand, the region is home to world-class strategic mineral deposits for the development and promotion of humanity. These mineral deposits are, among others: copper, cobalt, tin, tantalum, niobium and gold (Amisi, 2010; Melcher *et al*., 2008; Nest, Grignon & Kisangani, 2006; Nzongola-Ntalaja, 2002). This region is also the source of the Congo River, which provides drinking water, hydroelectric power as well as a source of constant irrigation of agricultural land. The agricultural sector of the Katanga Copper Belt contributes significantly to food security. In addition, according to KPMG (2014), the DRC mining sector presents a high-return opportunity due to its unique position with substantial untapped gold, copper and cobalt. Furthermore, the mining sector of the Katanga Copper Belt is attracting international mining companies (KPMG, 2014). However, the DRC is unable to develop the country while the environment continues to be degraded. The world economic forum white paper (2016) note that, all UN 2030 Sustainable Development Goals can be achieved through mining when managed appropriately to create jobs, spur innovation and attract investment and infrastructure development. In the long term, unregulated mining activities will also pose a threat to surface and groundwater. The issue of sustainable mining is not unique to the Katanga Copper Belt, but it will provide context for exploring research questions and producing useful results and recommendations that can be adopted in other similar settings (Bloch, 2015; Mayundo, 2016; Garrett *et al*., 2010).

In order to explore and understand whether the DRC has introduced a framework of sustainable development practices for the mining development project, some policy analyses were conducted. The sources of data which are used to understand the role of the environmental legislation in mining include secondary sources such as previous studies, photographs, videos and recordings (Creswell, 2009; Philip, 1998).

The understanding of environmental legislation administration for the promotion of sustainable mining in the Katanga Copper Belt was obtained through interviews with stakeholders in the mining industry. An essential aspect of the interviews with professional is that they were given the platform to suggest solutions to the current challenges in shortcomings of the implementation process of environmental legislation as well as community development. The proposed solution is used to put in place a system of sustainable mining interventions for the Katanga Copper Belt. In-depth and semi-structured interviews were conducted by engaging the operating and management personnel of mining companies; the government officials and NGO representatives (Douglas, 1985; GilChrist, 1992; McCraken, 1998; Spradley, 1979). A structured questionnaire was used for a survey which was conducted in the local community in order to assess the impacts of mining activities on their community in relation to the three pillars of sustainable development economic, social and environmental (Gomes *et al*., 2014 and Singh *et al*., 2012). In addition, direct participant observation was done to cross-reference with the data sourced by other methods (Burawoy, 1972; Creswell, 2003).

The data collected were analysed using a thematic content analysis approach by classifying narrative texts in order to conclude thematic content (Kassarjan, 1977; Holsti, 1969; Budd *et al.*, 1967). Emerging issues of the data collected have been prepared, read, analysed, and then grouped into some interrelated themes using a "coding" process (Creswell, 2009). A detailed discussion of the methodological approach of the thesis is discussed in details in Chapter 4.

1.8 Scope and limitations of the study

The focus of this study was on the issue of sustainable mining practices in DRC in order to inform the future sustainability mining practices in a country that has adopted the principles of sustainable development as a guiding principle for economic development. However, more importantly, is aimed, to investigate ways in which future sustainability can be achieved using mining activities which were unregulated for many years. Otto (1997) suggests that a nation's mineral policies must be in line with their development goals. It is the primary tool through which governments first articulate their development orientations and define the roles of all participants in the implementation of that particular policy. In keeping with this view, according to François (2006) in 2002, the DRC adopted a mining policy guided by the principles of sustainable development and incorporated it into its

policies to be applied in the mining sector. Following the mining legislation, the revised constitution of the country of 2006, as well as the Environmental Code of 2011, also adopted the same principles.

The issues of sustainable mining are not limited to the Katanga Copper Belt but concerned the entire region with a mineral deposit in the DRC. Nevertheless, the thesis does not intend to exceed the limits of the Katanga Copper B elt and the DRC. Therefore, the study is geographically limited to the cities of Lubumbashi and Kolwezi which are significant copper and cobalt mining towns. A preliminary observation of these two cities revealed parallelism between the mining activities and the daily life of the local community as well as the proximity of environmental degradation and mining activities. The use of more than one site in the study would lead to a broader perspective and an acceptable finish.

The study is limited to the investigation of the implementation of environmental legislation in the mining sector of the Katanga Copper Belt for the promotion of sustainable mining and community development. As a result based on Mzembe *et al*., (2014); Laurance (2011) and Gifford *et al*., 2010) assessment, the study focused on how mining stakeholders uphold environmental legislation for sustainable exploitation of the mineral resource, sustainable environmental management, community development as well as health and safety of mine workers and local communities. This is consistent with Mtegha's (2005) suggestion that a working group of interested stakeholders should act as a management structure to administer, monitor and implement the action programme at a strategic level. Therefore, the data collection was limited to key government officials who are well vested in the administration of environmental legislation, representatives of mining companies, NGOs and local communities benefiting from natural resources.

The scope of the study is also limited to environmental legislation, including mining policies for the promotion of sustainable mining practices. The study could have been conducted using a different industry to analyse sustainable development practices. However, mining activities present equally opportunities and threats for local communities, government and the natural environment it was essential to investigate the role of environmental legislation in protecting the environment and the community. It is evident that mining can provide significant employment, economic opportunities and government revenues if the legislative framework within which it must operate is implemented efficiently. Thus, the UN concluded

that many developing countries with mineral reserves could achieve millennium development goals through mining activities. It is also found that principles of sustainable development framed the DRC's mining policies. With this in mind, it was clear that the mining sector is the perfect industry for the study and the analysis of the administration of environmental legislation in the Katanga Copper Belt.

1.9 Relevance and contribution of the study

Mining companies operating in developing countries that have weak state institutions struggle with the implementation of environmental legislation and the sustainable development of local communities. The impact of their activities on natural biodiversity continues to negatively affect and jeopardize the future generation's ability to survive. In this context, environmental legislation and good governance have strongly emerged in recent years as key factors to successfully promote sustainable mining in developing countries. However, in many cases, the environmental policy is conducted for compliance reasons with financial institutions and tick box exercises rather than transforming the mining industry to the benefit of the local community. According to Gomes *et al*., (2014) and Singh (2012), the UN Sustainable Development Goals note that the mining industry has potential to contribute to the sustainable development of local communities and reduce poverty in Africa. In addition, the Africa Mining Vision portrays the development State perspective on mining and endorsed by the African Union Summit published in February notes that: "Mining can be a blessing for Africa as long as the African States manage and govern foreign and domestic investments in the mining sector well" (Africa Mining Vision, 2009:3). These views are an indication that Africa has acknowledged the significant place and role of the mining sector to the growth of Africa's economy and the transformation of its natural resources into wealth. According to the International Alliance on Natural Resources in Africa (2011), these views also suggest the potential of mining to benefit future generations.

This, therefore, links socio-economic development to sustainable mining (Africa Mining Vision, 2009:3). Yet the cost of developing and operating mines in developing countries that have weak state institutions have escalated to the disadvantage of local community development and environmental biodiversity due to non-implementation of environmental legislation or weak application.

International experience has shown that good governance with properly structured and administered state institutions and collaboration with all mining stakeholders as recommended by the EL can improve EL application and accountability. It also has the potential to generate substantial benefits to individual economies and regions. These approaches have helped prevent and reduce environmental hazards as well as promote sustainable development of local communities around mine activities. Just like the recommendations of the ICMM, the emphasis is on the interaction between the mining sector and government institutions as critical determinant factors for achieving sustainable mining (ICMM, 2006).

In the same vein, Schure *et al*., (2011) argue that SADC and the Africa Mining Vision advocate for the harmonization of mining policies, standards and legal regulatory regimes. In addition, Gibson *et al.,* (2013) and the UNEP (2011) notes that the two bodies take a more economic approach to what sustainable mining entails and provide a detailed account on how mining can contribute to macro-economic growth and development objectives. However, some of these international initiatives fail to define the role of local environmental legislation in sustainable mining discourse. More so they fail to put in place practical steps that mining investment from developing countries should follow to fill up the governance gap created by weak institutions, corruption and lack of accountability in the mining sector.

For that reason, this study helps to contribute to the debate of the role of environmental legislation in sustainable mining by momentarily outlining the existing governance gap that have led to weak and non-application of EL and "unsustainable mining" as well as by analysing the best practice of environmental governance in the mining sector that could help fill the governance gap affecting the mining sector in developing countries. This thesis is the first general assessment of EL role for the promotion of sustainable mining in the democratic republic of Congo and calls for collaborative and cooperative mining and environmental management approach in the mining activities is carried in the DRC and particularly in the Katanga Copper belt. In addition, the study highlights the importance of EL for sustainable development of local communities. Therefore, the contribution of the study to the scientific body is to fill the gap between environmental legislation and the practical implementation for better management of the environment and promote sustainable mining on one hand and on the other hand help mining companies operating in the DRC build sustainable communities.

In summary, the study will serve to increase the scientific body of knowledge on environmental legislation for environmental management and mining contribution to sustainable development in developing countries where natural resources are big contributors of the GDP and source of job creation and economic growth (UNEP, 2011; Peggs, 2006 and Kumar, 2006).

The proposed outcome will be a combination of a PhD thesis and scholarly articles in the form of journal articles drawn from the thesis.

1.10 Ethical issues

According to Neuman (2011), it is important to consider the ethics of a social science study because it includes human subjects. Therefore, all participants must be informed, and their participation must be understood and obtained voluntarily. Robsons (1993: 471) states that "whenever possible, the investigator should inform all participants of the objectives of the investigation and all aspects of the research or intervention that might reasonably be expected to influence willingness to participate". More importantly, the consent form should contain information about research in a language that can be fully understood so that consent is informed (Silverman, 2015). With this in mind, the study observed and followed ethical guidelines which are in accordance with those provided by the University of the Witwatersrand (2016). The study was conducted based on explicitly ethical policies that were accessible to and explained to the study participants. The ethical issues considered by the study include the consent of the informants, the confidentiality agreement, anonymity, access and acceptance. These questions are a valuable guide for the study (Robson, 1993). Since the majority of respondents were Francophone, all consent and participation forms, including questionnaires, were translated into French.

Each informant of the study received full attention and explanation about the purpose of the study. Furthermore, it was explained to all study participants that their participation was their optional and that they have the right to answer or not to the questions that they were not comfortable with. All information provided by the participants was treated as confidential. The names of the respondents were kept confidential for protecting them against any form of threat or embarrassment that could arise if their identity were to be revealed in line with Burawoy's (1972: VI) affirmation that "... sociologists have the responsibility to preserve the anonymity of its informants ". After following all of the

above guidelines, the study proposal, along with the information forms, interview questions and consent forms, were written and submitted to the University of Witwatersrand Human (non-medical) Ethics Committee for approval. The ethical authorisation was obtained after corrections were made to the original documents (see Appendix A).

1.11 Structure of the thesis

This thesis is organised into seven chapters and is a monograph. Chapter 1 provides the background, conceptualisation and the scope of the study. Furthermore, this chapter presents the aims and objectives, methodological approach and ethical considerations. Chapter 2 discusses the literature on sustainable mining practices, environmental legislation, and international experience of environmental legislation in sustainable mining practices. Chapter 3 presents an image of the study area including an overview of the mining sector in the DRC, the historical and contemporary perspective on mining activities. Chapter 4 discusses the research methodology, data collection tools and techniques as well as sampling techniques to evaluate the role of environmental legislation in promoting sustainable mining and sustainable development of local communities. Chapter 5 presents the empirical evidence collected during fieldwork with mining stakeholders, community surveys and observations in the cities of Lubumbashi and Kolwezi. Chapter 6 is dedicated to the analysis and discussion of the empirical results in light of different literature and aims of the study. Chapter 7 is the last chapter of the study, and it presents a summary of critical findings, essential contributions as well as the conclusion, recommendations and future research avenues.

CHAPTER TWO

THEORETICAL CONSIDERATIONS AND LITERATURE REVIEW

*"Everything that is used and consumed by people comes out of the ground one way or another, if it is material, it is mined, if it is eaten, it is grown and harvested using chemicals, fertilizers and equipment that is mined. If it is used, it is grown and produced on the extracted material. It is quite simple: more people, more money, more consumption, more mines". (*Michael Solomon, 2011*)*

2.1 Introduction

The focus of this chapter is to review the theory of sustainable mining and environmental legislation underpinning the study. This is important because the understanding of theories pertaining to the issue and formulation of the research questions, goals and objectives according to Reeves *et al*., (2008: 631) "provide complex and comprehensive conceptual understandings of things that cannot be pinned down: how societies work, how organisations operate, why people interact in certain ways". More so, it helps the study to "design a research question, guide the selection of relevant data, interpret the data, and propose explanations of causes or influences "(Reeves *et al.*, 2008:631).

The analysis of concepts and literature is contextualised by the fact that mining activities always result in severe disturbance of the natural environment (Middleton, 2013). For instance, mining and mineral processing wastes can leave environmental, social and economic impacts for thousands of years (Kemp, Bond, Franks and Cote, 2010). The effects of mining activities which date back 4500 years in Spain are still present through water contamination in the Rio Tinto estuary (Leblanc, Morales, Borrego and Elbaz-Poulichet, 2000). More importantly, poor people around mining operations in developing countries are generally severely affected by environmental degradation worldwide (Brulle and Pellow, 2006). Nevertheless, according to Moran, Lodhia, Kunz and Huisingh (2014); (Campbell, 2009; Eggert, 2001; O'Callaghan, Graetz and Terry, 2017).

According to Azapagic (2004), the mining industry has played an essential role in ensuring an acceptable quality of life. Nevertheless, Laurence (2006) stressed that the

challenge is the understanding of the role of the mining industry in a sustainable world which requires the answering of questions such as: how do the uses of minerals contribute to sustainable development, personal goals, and organisational goals. Another question asked is whether developing countries will be able to solve their environmental problems through environmental legislation (Mayda, 1984). To answer these questions, one needs to review the literature and theory of sustainable development and environmental legislation. Therefore, this chapter begins by defining the concept of sustainable development, followed by a discussion about sustainable mining practice concepts. According to Revuelta (2017), the concept of environmental legislation is also discussed and how this has shaped sustainable mining practices of developed and developing countries. To conclude the chapter, the international environmental framework in which sustainable mining practices are conducted is presented. Furthermore, in line with Revuelta's (2017) assertion, the concept of sustainable mining and environmental legislation are discussed from a practical point of view, arguing that practical application of environmental legislation that has captured sustainable development principles can result in the sustainable management of the environment and sustainable mining practices.

2.2 Contextualising the literature: A global perspectives of environmental legislation in sustainable mining practices

According to Cerin, (2006) Dernbach (1998), Dernbach (2003) Stoddart (2011) even though there are many definitions of sustainable development, the globally accepted definition of sustainable development is the one provided by the Brundtland Commission of 1987. The World Commission on the Environment and Development, (1987:43) defined sustainable development as "a development that meets the needs of the present without compromising the ability of future generations to meet their own needs. The definition of sustainable development provided by the Brundtland Commission introduces the concept of needs. This means that today's mining activities must take into account the needs of tomorrow's generation. Sadler (1996) argues that the sustainability concept is "the passing of an equivalent or greater…resource endowment or capital bequest to the next generation, so that it has the same or better opportunity to meet its needs as the present generation". Hence, Drexhage and Murphy (2010) argue that the adoption of the Brundtland Report by the United Nations (UN) General Assembly has given the term "sustainable development worldwide recognition. The key element of this definition that is relevant to the study is the concept needs and equity. According to Ema (2015), the concept of equity in sustainable

development practice helps with safeguarding resources for future generations because the overall goal of sustainable development is the long-term sustainability of the economy and environment. Therefore, according to Yigitcanlar *et al.,* (2015) in order to achieve the sustainability goal, it is important to integrate and acknowledge the economic, environmental and social concerns in the decision- making the process.

According to Ramades (2009), sustainable development is perceived as a development that respects the natural environment and uses it cautiously, based on the rational and moderate exploitation of nature and its resources, to ensure the indefinite maintenance of biological productivity for future generations. Sacquet (2002) argues that the concept of sustainable development uncovers some problems that affect all areas of life and the interaction of human societies such as the recycling of renewable resources, protection of biodiversity for threatened species, and exploitation of non-renewable resources. The United Nations Conference on Environment and Development (1992) stated that sustainable development has been embraced as a guiding principle for policy development by the international community (UNCED, 1992). Hence, Todorov and Marinova (2009) argue that sustainable development can be understood as a framework that describes the interaction between pairs of a humanity-economy-nature triad, as well as between the three. The focus is on a new development approach that emphasises the interaction between humanity, the economy and nature. Gibbs (2000) emphasised the importance of the three pillars of sustainable development to thrive simultaneously.

Pearce (1988) simplifies the definition of sustainable development by stating that it is an approach to make things last, to be permanent and sustainable. However, the question that arises from Pearce's analysis is what needs to be sustained? In response to this question, Pearce (1988) suggests that objects of choice ranging from agriculture, health or economics should be sustained. In some cases, only one aspect of sustainability is given much attention. This approach of sustainability is viewed as weak sustainability because it has resulted in trade-offs especially when the need of an entity could only be met at the expense of another (Hopwood *et al.,* 2005). One example of this approach is the growth approach when economic growth and resource use are limited to favour environmental protection (Meadows, Meadows and Randers, 1992). According to Bowler (2002), the emphasis on strong sustainability is based on all ecosystem functions and services can be adequately valued economically. Thus, Giddings *et al.,* (2002) conclude that the current sustainable

development framework is one whereby both spheres of society and the economy are seen to be nested within the environment.

According to Botin (2009) one of the main reasons for introducing sustainable development concepts in mining operations is based on the facts that mining is one of the oldest human activities which have contributed to the improvement of the quality of life through housing, household goods, industrial equipment, energy and technologies used for space exploration. However, the mining industry is ranked among the major industrial sectors facing significant environmental challenges that can negatively affect the well-being of local communities. Akabzaa (2009) has pointed out that mining activities, especially open-pit mining, have led to the destruction of valuable agricultural land, thus depriving poor local communities of their land rights and valuable assets to their livelihoods. Moran *et al.*, (2014) stressed that addressing the sustainability challenges of the mining industry has become a global challenge. The concept of sustainable development has received more attention and remained valid and relevant to the challenging objectives of mining (Barton, Grant & Guise, 2003). Consequently, Von Bello, (1993) argues that it was necessary for the mining sector to introduce the concept of sustainable development in order to cope with the impacts of the depletion of natural resources and the environmental risks caused by mining activities. However, the concept of sustainable development has raised many challenges in the mining sector.

Hilson (2000) argues that the foundation for sustainable development is environmental legislation that requires the development of comprehensive environmental management structures and practices. According to Percival, Schroeder, Miller and Leape (2017), environmental legislation can be understood as all laws and regulations relating to air quality, water quality, wilderness, wildlife and other environmental factors. Furthermore, according to Kokko (2015), environmental legislation sets the minimum standards for controlling and preventing pollution. It is essential to understand that environmental legislation covers a set of laws and regulations that work together for a common goal, which is to regulate the interaction between man and nature in order to reduce the threat to the environment and public health (Percival *et al*., 2017; Baldwin *et al*., 2012 and Webber, 2000).

Therefore, Gibson (2006) argues that it becomes important for environmental legislation to incorporate and take into consideration the concept of sustainable development which

encompasses social, economic and ecological initiative. According to Vijay (2015), environmental legislation is the foundation for sustainable management of the environment. According to Zhilin (2014), environmental legislation has become an integral part of domestic and international legislation. Environmental legislation according to (Colchester, 2004) is also understood as a set of plans and actions justifiably adopted by governments for a common goal of a secure and sustainable living on earth.

According to Sutton and Weiersbye (2007); (Rahim, 2013) environmental regulations have been perpetuated with the intention of protecting the environment for the benefit of present and future generations. In the same vein, Idowu (2013) and Porter and van der Linde (1995) stressed that for environmental legislation to have a positive impact on the ground; business operations must respect three essential principles. Furthermore, according to Porter *et al.*, (1995) and Wood & Richardson, (2006), the principles that environmental legislation must be based on the possibility to: create maximum opportunities for businesses; comply, innovate, reduce, minimise any form of uncertainty at any stage of the regulatory process; and to encourage the development of the state and quality of the natural environment rather than the use of particular technologies.

It is mainly industrial activities, urban development and other forms of environmental pollution of the 1960s, which led many countries around the world, mostly in developed countries, to put in place measures in the form of environmental legislation to deal with the increase in environmental pollution (Zhilin, 2014). According to Dasgupta, Wheeler, Mody and Roy (1999), the rise in international concerns about environmental hazards caused by different forms of development has resulted into the emergence of environmental legislation in Europe and other developed countries to control the pollution of air, water and land. Zhilin (2014) argues that the introduction of sustainable development concepts in the 1980s for environmental management has resulted in a change of formulation and a practical approach to environmental legislation. Nevertheless, Zhilin (2014) further stressed that environmental legislation formulation has shifted from pollution control and treatment to prevention and the management of the development as well as the use of natural resources. Thus, Laurence (2011) stressed that the mining industry began to introduce the concept of sustainability with the view that economic growth and ecological or environmental values are incompatible.

According to Das Sahrma (2008); Himley (2010) and Moran *et al.,* (2014) sustainable

mining objectives can be achieved through the three strands of social equity which recognise the needs of everyone, maintenance of stable economic growth and employment, using natural resources prudently while protecting if possible enhancing the environment. Thus, Idowu *et al.,* (2009) argue that the concept of sustainable development requires a legislative framework within which to operate and produce measurable results. Furthermore, Azapagic (2003) stressed that the mining industry is considered one of the industrial sectors facing some of the toughest sustainability challenges because it must integrate the economic, environmental and social concerns in the decision-making process. These problems stem from the potential of the mining industry to negatively disrupt the natural environment, but primarily through unregulated mining activities.

According to Laurance (2011) and Allan (1995) for sustainable mining to exist, the mineral utilisation rate must not exceed the ability to discover new sources and an acceptable substitute or ways to recycle existing resources. However, Allan (1995) view of sustainable mining is limited to the use of materials without considering the impact of mining activities on the landscape that is important for the livelihood of local communities. Therefore, James (1999) suggests that the only way for the mining industry to achieve sustainability is to consider social, environmental and economic concerns. The literature extracted from Allan and James shows that the concept of sustainable development is polarised. According to Eggert (2006), sustainable mining can be contextualised in the form of environmental quality, economic growth and social justice. Laurence (2011); Horowitz (2006); Rajaram *et al*.,(2005) highlights that mining activities and the sustainability concepts are an oxymoron because mining will not last forever. Thus, according to Laurence (2011); Rajaram *et al.*, (2005), sustainability encompasses more than just the availability of resources, mining should take into consideration sustainability practices as it is not an infinite activity.

Horowits (2006) argued that while the concepts of sustainable mining appear to be an oxymoron, these terms are not antithetical. However, according to Rajaram *et al*., (2005: 2) the concept of sustainable mining can be considered an oxymoron and emphasises that "it is true that no mine can last forever, but it is not necessarily relevant, because sustainability encompasses many more values than the continued availability of developed resources". Thus, according to Azapagic (2004) and Eggert, (2006), it is important to take into account environmental quality, economic growth and social justice in order to achieve sustainable

mining. Laurence (2011) and Rajaram *et al.,* (2005: 3) note that for mining to be sustainable it must be conducted in "… in a way that balances economic, environmental and social considerations, often referred to as" the triple bottom line and that "sustainable mining practices are those that promote this balance".

The central question that arises from literature is how to assess the sustainability of mining operations? According to Hilson (2000) in order for mining operations to contribute to sustainable development, they must first commit to protecting the environment, which involves a thorough review and improvement of environmental management techniques, including training, planning and auditing. However, mining needs to become more proactive in the critical areas of environmental governance that are controlling, mitigating and tracking resource consumption. More importantly, mining companies seeking to achieve sustainable mining and promote sustainable development must be flexible and pragmatic in their management approach, as the impact of mining on the environment varies and is significant (Hilson, 2000). Furthermore, sustainable development practices promote sustainable environmental management by preventing environmental pollution problems before they manifest themselves in environmental crises (Hilson, 2000).

According to Bansal (2005) provides three conditions that mining must abide by in order to effectively integrate sustainable development practices into its day-to-day operations. These are first is the environment that calls to reduce the size of ecological footprints; the second is social that require to evaluate, manage and engage proactively with all stakeholders (not just financial shareholders), including the natural environment and always act in the best interest of the company. The last is the economic condition that creates and captures value. The value captured is then transferred to shareholders through dividends, consumers through its products and employees through wages and salaries (Bansal, 2005).

According to Hilson (2000), the social advancement of all stakeholders and the creation of harmonious relationships with communities living close to mining operations is essential for ensuring sustainability. Eggert (2001) argues that mining has the potential to ensure economic well-being in a socially just manner that does not reduce the quality of the environment or biodiversity through sustainable practices. Therefore, according to Parker *et al*., (2004) and Van Zyl, (2005), the implementation of sustainable development principles in the mining sector will depend on the context and location of mining activities. The challenge is that sustainable means continuous, which is something that mining activities

cannot guarantee (Laurance, 2011). However, profits from mining activities can be extended after the closure of mining through financing the development of secondary industries (ibid.). Nevertheless, according to Hilson and Basu (2003) achieving sustainable development in the mining sector will require good governance as a prerequisite for development. Hence, according to Hilson and Murck (2000), any mine seeking to achieve sustainability must improve planning, improve environmental management, have the cleaner technology, increase stakeholder participation, and allow for the formation of partnerships in order to improve training.

According to Azcue (1999), Barrett (2000), IIED and WBCSD (2002) and Lottermoser (2003), it is a well-known fact that mining should take into account its impacts, due to the fact that the legacy of mining effects may resonate for hundreds of years. Hence, according to the Ecologically Sustainable Development Working Group of Australia, (1991) and the World Commission on Environment and Development (1990), the primary objective of sustainable mining practices should be the environmental and social impacts of the extraction and recovery of various minerals and metals. Furthermore, according to Flint (2012) and Azapagic (2004), the mining industry should be able to demonstrate its contribution to the well-being of the present generation without compromising the potential of the next generation for a better quality of life. Hence, the fundamental challenges of managing the mining sector regarding sustainability are to build an interconnected and interdependent system that reflects the socio-economic, cultural and ecological complexity of mining projects (Mottola *et al.*, 2011). The legislative question is whether or not significant improvement has been made towards more sustainable blue mining practices (Fitzpatrick, Fonseca & McAllister, 2011a). For this reason according to Fitzpatrick *et al.*, (2011) much of the debate surrounding the sustainability of mining range from a dispute about the meaning of the term sustainability, the motivation for sustainable mining practices, and the effectiveness of sustainable initiatives.

Laurance (2011) and Revuelta (2017) concluded that for a mining project to be considered sustainable, it must be safe, demonstrate best practices in environmental management and community engagement, be economically sound and use mineral resources effectively (see figure 2.1) for sustainable mining framework).

Figure2.1: The sustainable mining framework (Laurance, 2011)

In summary, according to Moram *et al.*, (2014) and Azapagic (2004) it is important for the mining sector to ensure that an acceptable quality of life is available or will be available to people living on the earth. Therefore, Kumar (2014:27) notes that while sustainable development is "all about ensuring a better quality of life for everyone, now and for generations to come", achieving sustainable mining requires economic viability, cost-effective and technically efficient approaches. The attainment of these objectives will provide the capability to maintain continuous environmental and socio-economic improvements. The role of environmental legislation in this context is to "set the rules that are complemented by some mechanism, usually a public agency, for monitoring and promoting compliance with these rules" (Baldwin, 1998: 3). Furthermore, according to Revuelta (2017) emphasised that it is also important to note that, environmental legislation not designed exclusively for mining activities but to regulate any type of activities that can have negative impacts on the environment in terms of water, air and soil quality. For this

reason, most environmental regulatory approaches are aligned with the models created by the United States of America. These models are of a "command and control" regulation which consists of prescribed legislation, behaviour, and regulatory agencies to monitor and police compliance with the legislation (Gunningham and Grabosky, 1998).

However, in recent years the mining industry has come up with the new concept of self-regulation to deal with sustainability challenges of mining operations that need to be discussed such as the case of 'responsible mining which is presented in the next section.

2.2.1 Responsible mining

According to Broad (2014) view on the concept of 'responsible mining' stresses that it is the new buzzword which is given different meaning by different users. Hence, according to Broad to Broad (2014), there are different definitions such as the neoliberal definition, the corporate social responsibility, the structuralist definition and the meaningful definition. Broad (2014:5) concludes that the meaningful definition of responsible mining should mean "a more comprehensive notion of economically, environmentally and socially responsible mining". According to Mensah *et al*., (2014), Owen *et al.,* (2013) and Prno *et al*., (2012) the concept of sustainable mining requires free, prior, and informed consent of local communities, especially before any corporate "contribution" is made to local officials or communities. Thus, according to Phadke (2018) the like "responsible mining", or even a "social license to operate", maybe too controlled by industry to serve public agencies and national groups working beyond the boundaries of company towns. Hence, "creating a new structure for decision making is a challenge that requires not only investigating the environment where it may be suitable to mine locally, and perhaps even in the name of re-domesticating extraction, but also when alternatives like urban metals present a more sustainable long term option" (Phadke (2018).

According to Goodland (2012), the call for responsible mining is justified by the fact that mining activities were conducted based on t 'weak sustainability' that allows "trade-offs" among economic, social and environmental responsibilities. Furthermore, the concept of responsible mining has its origin in the combination of two terms 'mining' and 'responsible'. According to Gold *et al*., (2009), Sekhar (2002) and Binder (2002) responsible means ensuring a capacity for moral decisions and accountability; liable to legal review or, in case

of culpability to penalties; based on or characterised by good judgment that require truthful information (Goodland, 2012). However, the term mining is used to define the extractive industries of oil and gas as well as mining for metals (Goodland, 2012). Hence, based on the combination of the two terms, Goodland (2012:2112) argues that the paramount practice of responsible mining applies to mine corporations based on self-regulation principles. However, self-regulation and voluntary compliance are not enough. For real change, societies cannot rely only on the good intention and aspiration of corporations". (Include sustainable mining approach from government and legislation) "Corporate effort must be overseen by mandatory regulations, with third-party monitoring and government sanctions for violations. Though, the transition from voluntarily the following measure to accepting mandatory regulations with the third party, monitoring should be made as smoothly as possible. It must be noted that many international mining companies have adopted responsible mining rhetorically (ibid*).*

Bice (2016) for his part noted that the concept of 'sustainable mining' is based on five key principles of pillars: holistic assessment; ethical relationships; community-based agreement; appropriate boundaries and good governance. Thus, according to Bice (2016), the combination of the five key pillars governs the global best practice and inventive ideas to usher into new and improved approaches to the sustainable mining industry. Thus Goodland (2012:2012) concludes that responsible mining means: following best practice which entails "fully adopting all relevant policies and procedures as set out in OECD's guidelines for Multinational Enterprises, plus the eighth suggested principles; guidance regarding No Go Zones; voluntary principles and standards for responsible business conduct in areas such as employment and industrial relations, human right, environment, information disclosure, combating corruption, consumer interest, science and technology, competition, and taxation".

Furthermore, Goodland (2012) proposed eight principles that highlight the importance of social and environmental assessment (Principle 1), transparency (Principle 2), acceptance by stakeholders (Principle 3), food production (Principle 4), compliance with international standards (CSR) (Principle 5), prequalification or certification of potential mining permit seekers (Principle 6), insurance and performance bonds (Principle 7) and royalties, taxes and fees responsible mining (Principle 8). These principles are applicable to mining corporations of various sizes and should be implemented in order to attain responsible mining.

All the above-suggested principles by Goodland (2012) are key for achieving sustainable mining nevertheless some are based on the free will of mining companies through corporate social Responsibility (CSR). According to Warnaars (2012), Corporate Social Responsibility can be understood as new ways to alleviate the risk of conflict and to assist with restoring and gaining confidence and support from a wide audience including creating a favourable public opinion of a company's operations. Furthermore, according to Caroll (2016), Warnaars (2012) and Tuan (2012) CSR can contribute to sustainable development (economic), performing responsibly (ethical), caring for the community and the environment (philanthropic), and abiding by the law (legal). Furthermore, in the mining sector, CSR has been restructured to form a new business philosophy with an ethical management approach based on values, such as respect, honesty, and solidarity. It is also a model that, in principle, adopts larger responsibility for social and environmental damages related to or directly caused by mining activities (Warnaars, 2012). A business case is made for CSR that argues that it can be beneficial and can even help companies adhere to the goal of maximising shareholder value (ibid). Thus in the next section of the study, the role of environmental legislation for environmental legislation in the mining sector will be discussed. Even though in recent years the concept of 'responsible mining' which is more based on voluntary approach has gained momentum in the environmental management arena, the study focuses on environmental legislation role for sustainable mining because of the role that government institutions have for the compulsory enforcement of the national environmental legislation.

2.2.2 The role of environmental legislation in sustainable mining practices

Literature extracted from Inoue and Isozaki, (2013), Campbell (2009) ICMM (2009) MMSD (2002) and Hilson (2000) environmental legislation plays an important role in promoting sustainable mining practices by helping mining companies to protect the environment, regulate the use of natural resources and leaving a positive legacy for the environment and the community where they are based. Therefore, McDonald (2002) argues that the protection of the environment through environmental justice and the use of environmental legislation is more a matter of integrating environmental issues into the broader framework of human rights and democratic accountability. Furthermore, Lazarus *et al.*, (1997) stressed that; governments around the world should take legislative and administrative measures to protect citizens against any person or organisation that endangers their lives through mining activities.

Tiainene *et al*., (2012), Prno *et al*., (2012) and Prior *et al.,* (2012) argues that the leading role that environmental legislation should play in the mining sector and the promotion of a sustainable mining practice. Restrictive environmental regulations set minimum standards for controlling mine pollution (Kokko *et al.,* 2015). Furthermore, environmental legislation is considered as a useful and effective tool for the decision-making process in resource management and economic assistance (Mayda, 1985). However, some critics of environmental legislation stress that sometimes environmental regulations do not adequately address the needs of individual countries as they can become an obstacle for community development rather than a useful instrument for environmental management (ibid). In economic terms, environmental legislation can be seen as an obstacle to maximising profits because mining is capital intensive and developing countries rely on foreign direct investments (FDI) for development (Mayda, 1985).

Mayda (1985) raised a question of capacity and asked whether developing countries can solve their environmental problems through environmental legislation? According to Mayda (1985), the answer is yes, however, legislators and governments should pay attention to the conceptual approach and the practical application because the significant problems are conceptual and structural. In the same vein Bodansky (2008); McGarity (2004) and Oslon (1999) emphasised that the goals of environmental laws should be the protection and enhancement of the human environment. Environmental legislation can also be very complicated, particularly in the mining sector. Ridle and Couzens (2010) define the environment as a complex myriad of interdependent components, the understanding of which requires both specialised and general environmental skills, even when the subject appears on his face uncomplicated in purely scientific terms. The relevance of this statement is that the success of environmental legislation administration requires qualified human resources. Mayda, (1985) and McGarity (2004) suggest that the application of environmental legislation requires good governance and effective control of the administrative, executive and judicial systems. According to Bintu (2010), environmental legislation application is entrusted to the judicial and administrative organs of the country to ensure the success of the environmental quality and advancement of environmental rights for the interest of the public. Therefore, in the same vein, the ICMM (2006) concludes that interactions between the mining sector and government institutions are a determining factor for sustainable mining. According to Hornborg *et al*., (2016), Muradin *et al*., (2012), Himley (2010), Salgado *et al*., (2009) the organisational and institutional frameworks

through which decisions are made regarding resource development and socio-environmental implications have undergone a considerable transformation in recent decades. Therefore, (Himley, 2010) argues that in order to reconcile the community needs with the scale of natural resources, the concept of 'governance of natural resources' was introduced. By doing this, much emphasis is put on governance than on the government (Barnes, 2000; Jessop, 2002).

However, the governments still have an important responsibility of regulating and facilitating the access to natural resources as well as environmental management (Bridge, 2008, Emel & Huber, 2008; Otto, 1998; Bridge, 2004). Therefore, many countries in the world and in particular the global south have begun to adapt their environmental legislation to the concept of resource governance (Glave, 2007; Szablowski, 2002). It is important to emphasise that the introduction of the concept of resources governance combined with environmental legislation has improved the decision-making process about resources and the interaction between different stakeholders (Himley, 2010b). Below **Figure 2** illustrates the way in which the combination of natural resources, mining activities and effective good governance based on the good legislative framework can lead to positive outcomes such as sustainable mining practices.

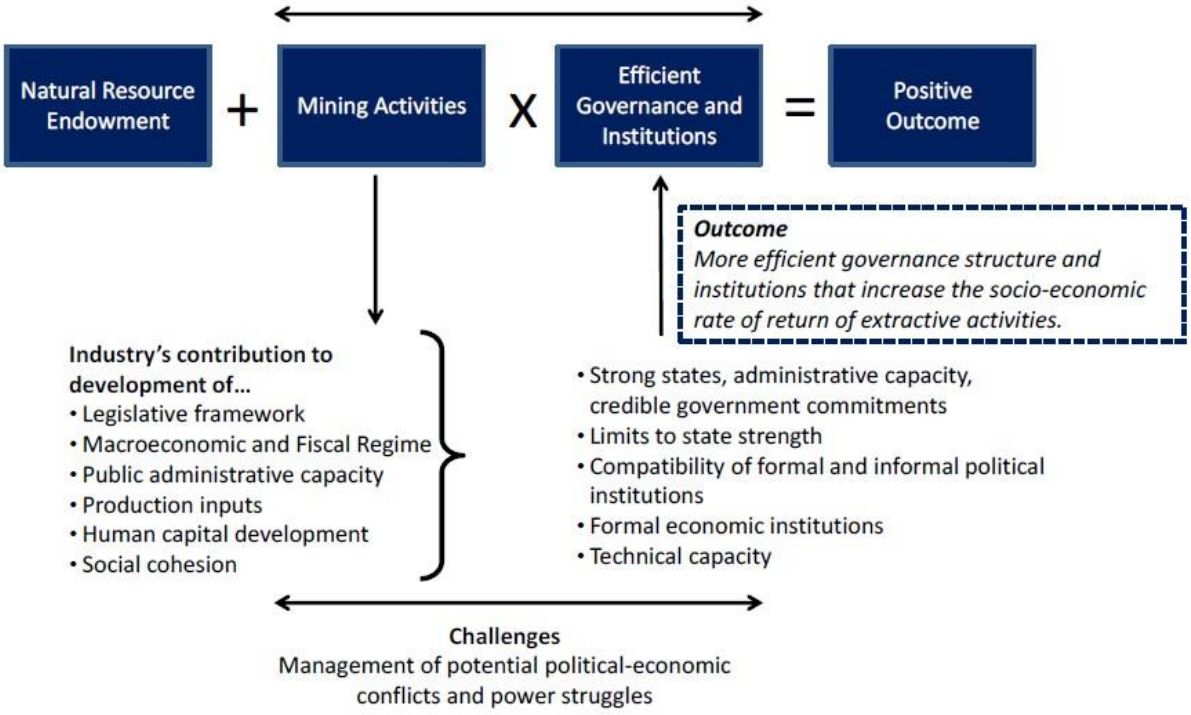


Figure 2.2: Links between natural resources, mining activities and efficient governance (ICMM, 2006)

2.2.3 International framework for the promotion of sustainable mining

In addition to local and national environmental legislation, the international mining community has developed frameworks within which sustainable mining practices can be conducted and achieved. One of the international frameworks is the 2002 Mining, Mineral and Sustainable Development (MMSD). The MMSD (2002) has developed seven key questions to guide the mining sector for achieving sustainable mining. According to Kumar and Kumar (2016), van Berkel (2007) these questions are interconnected and are the following: Are engagement processes in place and functioning effectively? Will the well-being of people be maintained or improved? Is the integrity of the environment ensured in the long term? Is the economic viability of the project or operation is assured, and will the economy of the community and beyond be improved? Are traditional and non-market activities in the community and surrounding areas accounted for in a manner acceptable to the local population? Are rules, incentives, programs and capabilities in place to deal with the consequences of projects or operations? Does a complete summary show that the net result will be positive or negative in the long run, and will there be periodic re-evaluations?

According to Solomon *et al.*, (2008), the 2002 MMSD widely regarded as an essential political catalyst for the global mining industry. Solomon *et al.*, (2008) argues that the MMSD is supported by the formation of the International Council on Mining and Metals (ICMM) to act as a representative of the global mining industry. The DESA (2004) report that, in 2002, the World Summit on Sustainable Development (WSSD) established standards in the form of essential responsibilities that the mining industry should observe in order to ensure sustainability The relevance of WSSD is that it has led to the transformation of relations between stakeholders (Ferraz, 2002). According to Bardy (2012), Rothstein (2011) and Hopwood *et al*., (2005) The United Nations recommends that private sector approaches sustainability are encouraged to integrate into their operation approach, social considerations such as poverty eradication, reduction of infant mortality, primary education, environmental sustainability, and enable a global partnership for development.

According to Charles *et al.*, (2017), GRI (2011), WBCSD (2010), Waddock (2008) and Tencati (2004), in response to the United Nations recommendations, the private sector, under the leadership of the World Business Council for Sustainable Development (WBCSD), has accepted the recommendations and principles of sustainable development

have been integrated into the management of private enterprises. The vision of the ICMM is that the mining sector is respected and recognised as essential to society and the principal supplier of sustainable development. Member acceptances are based on the merit of establishing trust and respect with key stakeholders based on good sustainability performance that includes a clear and comprehensive approach to reporting and assurance (Ferraz, 2002).

The ICMM also serves as an executive officer representing the mining industry to address critical issues and emerging issues affecting the mining industry (ICMM, 2011). One of the innovations of the ICMM is that it addresses the growing problems that affect the mining industry through the available guidelines that promote good practice and improved performance. Most importantly, once the industry has approved the practice and guidelines, they must be applied internationally and in different mining activities. However, the challenge is for the small, medium-sized, artisanal mining industry that has not adhered to some international conventions and procedures on the mining development industry.

The action of the ICMM has two objectives. First, improve the practices or technologies of the mining industry concerning sustainable development. Second, improve the public perception of the mining activities to be considered as an ideal partner for the development of mineral resources. Furthermore, according to Fonseca *et al*., (2014), Kem *et al*.,(2011), Kemp (2009) the ICMM has developed a framework of sustainable development for the mining sector which includes principles of public participation and independent insurance that is mandatory for all mining companies. See below **Table 2.1**, the guiding principles of the ICMM for sustainable development in the mining sector.

	PRINCIPLES
1	Implement and maintain ethical business practices and sound system of corporate governance
2	Integrate sustainable development considerations within the corporate decision-making process
3	Uphold fundamental human rights and respect cultures, customs and values in dealings with employees and others who are affected by the activities
4	Implement risk management strategies based on valid data and sound science
5	Seek continual improvement of the health and safety performance
6	Seek continual improvement of the environmental performance
7	Contribute to the conservation of biodiversity and the integrated approach to land use planning for products
8	Facilitate and encourage responsible product design, use, re-use, recycling and disposal of products
9	Contribute to the social, economic and institutional development of communities in which there are operations
10	Implement effective and transparent engagement, communication and independently verified reporting arrangements with stakeholders

Table 2.1: Sustainable development guiding principles for the ICMM (ICMM SD Framework – Final Principles, 2003)

The guiding principles for sustainable development for the ICMM are used as a guide to evaluating sustainable mining practices of large mining companies operating in the Katanga Copper Belt.

According to Evangelinos and Oku (2006), the sustainable development framework for the mining industry at an international level is also supported by the WBCSD. Charles *et al*., (2017), Bocken *et al*., (2014) Maon (2009) and Rayney (2010) the mission of the WBCSD is to build a business case for sustainable development and act as a catalyst for change in the business approach to sustainable development. The WBCSD provides a platform for its members to pursue sustainable development, and share their knowledge, experience and best practices. Furthermore, Mahidhara (2002) and Desimone *et al*., (2002), the WBCSD works hand-in-hand with NGOs and government institutions to advocate for companies on some issues related to sustainable practices and membership committed to

sustainable development and promoting the role of eco-efficiency, innovation and corporate social responsibility. As a result, WBCSD (2011) contained that all registered members are required to report publicly on their environmental performance and "... aspire to expand their coverage to cover the three pillars of sustainable development - economic, social and environmental".

More recently, according to Geissdor *et al*., (2017), Seebode (2012), Ehrlich *et al*., (2012) the WBCSD 2010 has developed and introduced the 2050 vision for businesses around the world. The vision highlights the role that businesses must play in leading the global agenda to promote the well-being of the human population within the bounds of the planet's natural resources by 2050. The seven critical pathways for the 2050 vision are set as the guiding principles for companies and mining companies to improve lives on the planet are illustrated in **Table 2.2**

Table 2.2: 2050 vision pathway to achieving sustainability: New agenda for businesses

	2050 critical pathway vision
1	Addressing the development needs of billions of people, enabling education and economic empowerment, particularly of women, and developing radically more eco-efficient solutions, lifestyles and behaviour
2	Incorporating the cost of externalities, starting with carbon, ecosystem services and water
3	Doubling of agricultural output without increasing the amount of land or water used
4	Halting deforestation and increasing yields from planted forests
5	Halving carbon emissions worldwide (based on 2005 levels) by 2050, with greenhouse gas emissions peaking around 2020 through a shift to low-carbon energy systems and highly improved demand-side energy efficiency
6	Providing universal access to low carbon mobility
7	Delivering a fourfold to tenfold improvement in the use of resources and materials

Source: World Business Council for Sustainable Development (2010)

(i) The mining industry is committed to the WBCSD as an entity of the global business fraternity. According to Kirsh (2010), as a result, mining companies are required to prepare annual reports that include:

(ii) Annual reporting of results by host country guidelines and international standards

such as International Accounting Standards (IFRS) and Generally Accepted Accounting Principles (GAAP);

(iii) The sustainability report following the guidelines of the Global Reporting Initiative (GRI). The mining company's sustainability report must, therefore, comply with local and international regulatory frameworks and the WBCSD, ICMM, and the United Nations Global Compact commitments.

However, it should be noted that it will not be easy for mining companies to always comply with local and international regulations because transnational private companies are profit-driven for shareholders. Therefore, profit and shareholder values will always be evaluated concerning the company's involvement and the promotion of sustainable development in its management approach. Hence, according to Weiblen *et al.*,(2015), Pearson *et al*., (2013) and Ferraz (2010) stressed that in order for the mining sector to justify their involvement in non-core activities, the added value for shareholders, employees, contractors, suppliers, customers, business partners and host communities must often be measured by the company as a means to reduce risk and long-term liabilities. Therefore, in the next section, the study delves into the discussion of some of the main voluntary regulations that apply to mine sector which some of the major mining companies (TFM, MUMI, RWASHI and METALKOL) have been applying in their day to day operations.

2.2.4 The global compacts; Equator principles and financing requirement from the World Bank

According to Conley and Williams (2011), voluntary business regulation is becoming a more and more prominent feature of global environmental governance. Ruggie (2004) note that basis for this practice is the large and important relationships between institutional international organizations, transnational corporations and civil society groups, which have placed the private sector at the centre of global responses to environmental problems Therefore in the next section the study analyses some voluntary business regulation such as the Global Compact, the equator principle and the financing requirement from the World Bank.

a) The global compacts

According to Okeefe *et al*., (2014), Pearson *et al*., (2013) and Ruggie (2001) the global compact (GC) engages the private sector to work with the UN, in partnership with international labour and NGOs, to identify, circulate, and encourage upright corporate practices based on nine universal principles. Furthermore, according to Ramasastry (2015), Runhaar and Lafferly (2009), it must be noted that the GC principles are drawn from the Universal Declaration of Human Rights, the International Labour Organization's (ILO) Fundamental Principles and Rights at Work, as well as the Rio Declaration on Environment and Development. Rieth *et al.*, (2007) note, the decentralization of Global Compact is an important process in order to extend the idea of corporate social responsibility. Furthermore, Ruggie (2001) argues that the GC is challenging companies to engage in good corporate practices as understood by the broader international community, rather than relying on their often superior bargaining position vis-a-vis national authorities, especially in small and poor states, to get away with less. Hence, according to Ruggie (2001), companies applying to the GC are required to adhere to GC policies and terms of the agreement as stipulated by the organisation. Furthermore, the registered companies are expected to post annual progress reports or updates that will be shared among various members in the partnership. In addition to this, these companies are required to join the UN and commit to various UN initiative aimed at assisting developing countries.

In sum, according to Shamir (2018), Smith (2012) and Ruggie (2002) the GC's strengths and weaknesses both originate from its approach to adopt a model that encourages learning by recognizing and reinforcing leadership. Even though the GC helps create and build in motion the practice of its universal principles by companies, it is unlikely to get the expected result of working alone.

Williams (2004) highlight that the UN Global Compact is a voluntary initiative designed to help develop a more humane world by soliciting businesses to observe principles regarding human rights, labour, the environment, and corruption. Furthermore, the most pressing matter about the GC is related to the issue of accountability. Hence, according to Scholte (2011), Andersen (2009) and Chen *et al*., (2009), the accountability issues are in four major areas:

- Accountability showing that the globalization of the economy actually helps the poor;
- Accountability showing the corporate performance matches rhetoric;

- Accountability that provides legitimacy to a two-tier pricing system and other measures that are designed to assist the poor in developing countries;
- Accountability in the human rights area; what societal expectations are multinational companies accountable.

According to Mamic (2017), Williams (2014), Warnaars (2012) and Ki-moon (2010) the ten principles of the Global Compact focus on human rights, labor rights, concern for the environment and corruption and are taken directly from commitments made by governments at the UN: the Universal Declaration of Human Rights (1948); the Rio Declaration on Environment and Development (1992); the International Labor Organization's Fundamental Principles and Rights at Work (1998); and the UN Convention Against Corruption (2003).

The GC principles focus on human rights (Principle 1), complicity (Principle 2), labour (Principle 3), forced labour (Principle 4), child labour (Principle 5), discrimination (Principle 6), precautionary measures related to environmental challenges (Principle 7), responsibility towards the environment (Principle 8), environmentally friendly technologies (Principle 9) and corruption prevention initiatives (Principle 10).

According to Archel *et al*., (2011), Kang *et al.,(*2011), Cetindamar's (2007) and Cunninghan (2007) the analysis of why companies adopt Global compact as indicators for environmentally responsible behaviour, conclude that companies have more than one reason for embracing environmentally responsible behaviour and that ethical and economic reasons co-exist. In terms of performance, the impact of participation in the GC appears to be mostly high in acquiring network opportunities and value-added company image.

According to Therien and Pouliot (2006) argue that the UN Global Compact represents the current state of the politics of international development in three distinctive forms. First, the Compact indicates a new thinking approach for development. This means the long decades of opposed relations between the business community and the UN has come to an end. The two have reached common ground for the promotion of sustainable development (Kirlo *et al*., 2017; Dahan *et al*., 2010 and Cetindamar, 2007). Second, according to Bulkeley *et al*., (2015) and Escobar, (2011), the Compact brings to light the ongoing development of more comprehensive forms of global governance, in response to the failure of traditional apparatuses of development cooperation. Third, ongoing debates about G C demonstrate to the competing worldviews that structure today's development debate. In conclusion, Therien

et al., 2006) argues that the GC shows that, beyond its ever-changing dynamics, international development ultimately remains a political, rather than a technical, process.

b) The equator principle

According to Wright (2012), and O'Sullivan *et al.,* (2009) the Equator Principles are a set of operational principles and standards embraced by more than 70 public and private financial institutions to manage environmental and social threats in project financing. Furthermore, according to Webber (2014), Mahanty (2013), Slack (2012) and Wright (2012), the direct link between the Equator Principles and the International Finance Corporation (IFC), the World Bank Group's private sector financing division, improves the legality and potential impact of the framework. Furthermore, Wright (2012 and 2009), Conley *et al*., (2011) and Hardenbrook (2007), note that the Equator Principles are a set of voluntary environmental guidelines produced to manage environmental degradation that results from large-scale developmental projects in the Third World. However, according to Wight (2012) and McMichael (2012) development of lending policies across financial institutions is greatly uneven, and the framework has not stopped lending to projects with significant environmental and social costs. Although the framework has improved relations between financial institutions and stakeholders, a lack of transparency undermines external accountability. Thus wright (2012) concluded that it is important to consider the scope for increased harmonization of environmental and social lending policies in international banking. According to Williams (2013) and Conley *et al*., (2011) the EPs only apply to *project finance*, which is the method used to provide private capital for large, privately sponsored infrastructure projects such as dams, oil and gas pipelines, mines, electrical power plants, and telecommunications facilities. Hence, according to Williams *et al*.,(2015) and Lozinski (2012) due to the high risks that might slow down or derail the project financed by lending institutions, the EPs emerged in part as a way to manage the following concerns: human rights and labour issues, community relationships, indigenous people's rights, environmental issues, and political turmoil generally.

According to Maconachie (2014), Mahanti *et al.,* (2013) Baker (2012) Meyerstein (2013), Large-scale infrastructure projects frequently caused a number of environmental and social threats on marginalized populations such as often indigenous people have very little political voice in the project approval process particularly in countries with weak regulatory capacity. Hence, authors such as Vogel (2018), Germain (2010) and Goldman (2006) in response to this situation following pressure from international activists and the changing norms and practices of development finance institutions such as the World Bank including some largest commercial banks in the world created a global private regulatory regime known as the

Equator Principles ("EPs ") to regulate their review of the environmental and social risks flowing from their investments in these projects.

However, according to Slack (2012), Esteves et al.,(2012), Richardson (2009) and Wright (2009), the acceptance of the Equator Principles by private financial institutions appears to be a substantial step toward implementing environmental standards in developing countries that lack adequate regulations. Three years after their commencement, discussion arises as to whether the principles are actually encouraging environmental change remains. To this end, Hardenbroo (2007) concluded that, notwithstanding a great deal of doubt regarding their real effect, the Equator Principles evidently have improved the situation by placing the private sector in an anticipatory environmental role and strengthening the public's ability to hold the financial sector accountable for its actions. Therefore, according to Conley *et al*., (2011), Schepers (2011) and O'Sullivan (2009) the main purpose of the Equator Principle is to "ensure that the projects [the EPFIs] finance are developed in a manner that is socially responsible and reflect sound environmental management practices "(Equator principle, 2003). Moreover, the Equator Principles apply to all financial projects with a total capital cost of at least $50 million (Equator principle, 2003).

The financial projects categorisation is conducted based their level of environmental and social risks as well as internal guidelines that are derived from screening conditions used by the International Finance Corporation (IFC), the private sector arm of the World Bank (Equator principle).

According to Hardenbroo (2007), the project's risks are assessed subject to the "type, location, sensitivity, and scale of the project and the nature and magnitude of its potential environmental and social impacts." Hence, based on the level of environmental and social risk, each project is categorised in the following manner: Category A projects are "likely to have significant adverse environmental impacts that are sensitive, diverse or unprecedented.' The risks to the natural habitat or cultural heritage sites of Category A projects are potentially irreversible and may extend beyond the project site. Category B projects pose potentially adverse environmental impacts on human populations or on important areas, such as grasslands, forests, wetlands, and natural habitats. Category C projects are likely to have minimal or no adverse impact on the environment.

Specifically, Atti *et al.*, (2017) and Muylaert *et al.*, (2014) the potentially adverse impacts of Category B projects are site-specific, frequently can be alleviated, and are hardly irreparable. Nonetheless, both Category A and B projects require that the company proposing the project to compile an Environmental Assessment (EA) report. While an EA for Category B projects should comprise the same important elements as those mandatory for Category A projects, Category B analyses normally are narrower in scope. However, Projects that fall into Category C do not require an EA. The EA must include an examination of both the negative and positive potential environmental impacts (The Equator Principles). In addition, Paek (2012), Ouko (2012), Watchman *et al.*, (2007) according to the equator principle (2006) the EA must also address the project's compliance with the laws of the host country and indicate the minimum applicable standards under the Pollution Prevention and Abatement Guidelines of the World Bank and the IFC. In the case that the host country is categorised as a low or medium middle-income country, it is important for the EA must take into account the applicable IFC Safeguard Policies. More importantly, the EA must be consistent with the classification procedures, as well as address the key environmental and social issues identified in the classification process.

However, according to critics of the equator principles such as Bartley (2007) and Schepers (2011), the moral legitimacy of the governance of the Equator Principles is highly debatable, a serious issue for private governance patterns. According to O'Sullivan *et al.*, (2009) and Solomon (2007), there are great gaps in the governance structure, and the processes and content of much of the Principles which are left to each individual bank, with little mandated transparency or accountability, principally at the level of individual transactions. Hence, Schepers (2011) conclude that the EP is a significant set of principles protecting environmental and social concerns in distant and under-developed areas. Nonetheless, the governance mechanism of EP is in need of consolidation through enhanced governance, clear metrics, adequate disclosure, and a strong network. According to Schepers (2011), the EPFIs must progress in these areas if they are to realize the reputational capital they perceive to be available. Hence according to Bartley (2007) critic of the EP are that contrary to other voluntary sustainability initiatives, there are no agreed-upon methods for certifying that a project meets EPs standards, furthermore, there are no organizations licensed to certify compliance. Somewhat, the EPs rely on self-enforcement by the member banks. Each institution that adopts the EPs asserts that it has or will put in place internal policies and processes that are in line with the Eps (ibid).

Weber (2014) analysis of the Equator Principles Reporting asked the question to know whether Financial Institutions Meet Their Goals. Hence, according to Weber (2014) stressed that, although the majority of members report about risk categories, sectors and regions, only a minority report them in a way that enables readers to combine the figures and to analyze how risk occurs in certain regions and sectors. Furthermore, Weber (2014), the reason for this practice is that most projects are not usually listed in a way that they are identifiable, the reports are non-transparent, making it impossible to allocate social and environmental impacts to certain projects, sectors and regions.

c) World Bank Group Environment, Health and Safety Guidelines

According to Berkel (2007) and Cammack (2004), the World Bank is an international financial institution that offers loans to developing countries for capital programs and it has two ambitious goals of ending extreme poverty as well as boosting shared prosperity. As a leading international financial institution, the WB has elaborated EHS guidelines to guarantee that projects they fund are environmentally and socially sound (Gunningham and Sinclair, 2017). Hence, Bruns (2014), Basu *et al.*, (2013), Clayton *et al.*, (2009) the WB Environmental, Health, and Safety (EHS) Guidelines constitute practical guiding and referral documents with common and precise industry sector illustrations of Good International Industry Practice (GIIP). The EHS Guidelines are applied as suggested by the relevant standards and policies in the event of any member of the World Bank Group involved in a project. Furthermore, according to (Rich, 2014) the WB EHS Guidelines are fashioned in a way to be applied in conjunction with relevant Industry Sector EHS Guidelines that offer guidance to operators on EHS matters in particular industry sectors. However, regarding complex projects, it is best to use various industry-sector guidelines (IFC, 2007).

According to Ncube (2015) and Blackburn (2012), the environmental, health and safety (EHS) Guidelines cover the procedures and performance levels usually believed feasible in new facilities by existing knowledge and expertise at affordable price. When EHS Guidelines are applied to existing projects, it may include launching targets that are site-specific as well as a fitting schedule of accomplishing them (Winter, 2010; Marshall, 2008 and Wong, 2012). Furthermore, according Silva et al., (2018), Prevention (2012) and Kiene (2010), the use of the World Bank EHS Guidelines should be adapted for impacts identified in a specific project based on the findings of an environmental assessment that considers site-specific conditions like the environment, country's legislation and related projected factors (IFC, 2007).

Therefore, the implementation of procedural recommendation should be conducted by skilled and competent individuals' professional. However, Wong (2012) argues that in the situation of a country where the project is conducted having legislation that differs from operational standard stated in the World Bank EHS Guidelines, projects are then expected to achieve what is more rigorous. If not as rigorous as stated by arrangements in EHS Guidelines in respect of particular project conditions, a systematic justification for any proposed options is essential as part of site-specific environmental valuation (ibid). Furthermore, according to the IFC (2007) and Geoff (2003), the justification must prove that the selection of different performance levels safeguards the environment as well as human health.

In the mining sector, according to Sinclair (2017) and Belem (2009), the World Bank EHS Guidelines linked to mining operations and involving ore processing facilities which can happen throughout the mine lifecycle. Instruction for the administration of EHS problems usually occurring in big projects is presented in the General EHS Guidelines. Hence, The EHS Guidelines for Mining consider habitat modification as a serious risk to biodiversity linked with mining. Furthermore, Heikkurinen (2017) and Silvis *et al*., (2013) the EHS states that habitat modification can happen at any phase of the mining cycle with the highest possibility for the short-term or irreversible alteration of earthly and aquatic environments taking place during the stage of starting mine and when the mine is operational. Nevertheless, during exploration activities, there is often a need to develop access roads, haulage passages, and mobile camps to accommodate employees which usually causes different extents of clearing of land and influx of secondary. It depends on the type of mine the amount of the land that will be cleared to accommodate various mine infrastructures ranging from process plant to roads (IFC, 2007). The World Bank EHS Guidelines for Mining identifies the necessary conservation requirements and development implications in a manner that is well-matched with land use requirements of local communities. Hence, according to the IFC (2007), the recommended approach for mining activities requires taking into account critical biodiversity, protected areas, habitat remedial programmes and the adverse effect of population growth on infrastructure and biodiversity. This includes engaging with important biodiversity stakeholders to comprehend any incompatible land-use strains and the community reliance on natural resources and/or conservation needs that occur in that area.

d) IFC Performance Standards on Environmental and Social Sustainability

The International Finance Corporation is an international financial institution that offers investment, advisory and asset management services to encourage private sector development in developing countries. According to Spratt *et al*., (2012) and Murphy (2010), the IFC is a member of the World Bank Group as a private sector arm which focuses on reducing poverty and promoting development. It achieves this through mobilising financial resources for private enterprise, promoting accessible and competitive markets, supporting businesses and creating jobs and providing necessary services for the poverty-stricken and vulnerable. IFC's Sustainability Framework expresses the calculated pledge to sustainable development and is an important part of IFC's method to risk management. The Sustainability Framework involves IFC's Policy and Performance Standards on Environmental and Social Sustainability, and IFC's Access to Information Policy. The Policy on Environmental and Social Sustainability defines IFC's obligations, activities, and duties linked to environmental and social sustainability. The Performance Standards are focused at clients, giving direction as to how to detect threats and effects and are tailored to help eliminate, restore and control impacts as a strategy of conducting business in a viable manner, including consulting stakeholders, and it is the responsibility of the client to reveal the activities the project involves. In scenarios where funding is directly from financial institutions, IFC wants its clients to use the Performance Standards to safeguard environmental and social threats and effects to boost development prospects (IFC, 2006).

The word "client" is utilised across the Performance Standards mostly to define the individual or organisation executing the project being funded or who received the project finance depending on the layout of project and type of funding. On top of satisfying the needs under Performance Standards, clients should obey the relevant national law as well as those laws fulfilling responsibilities of that country where the project is proposed under international law. The World Bank Group Environmental, Health and Safety Guidelines are practical guiding documents with general and precise examples of industry sector illustrations of good international industry practice. According to Birley (2013), Prevention (2012) and Dong 92010), during project evaluation the IFC is dependent on the EHS Guidelines as their practical source of information. The EHS Guidelines has performance levels and procedures that are acceptable to IFC and that are usually considered as achievable and affordable in new facilities using existing technology. For projects funded by EP FI, the use of the EHS Guidelines on existing facilities could require setting site-specific targets with a suitable

timeframe of accomplishing them. The EIA process can suggest other targets or methods whether high or low, if tolerable to IFC, then considered as a project or site-specific requirements (IFC, 2006).

The General EHS Guideline comprises information on wide-ranging environmental, health, and safety issues potentially applicable to all industry sectors. It must be applied in conjunction with the related industry sector guideline(s). The EHS Guidelines may be sometimes restructured. When the country where the project is being carried out the legislation is different from stages and procedures outlined in the EHS Guidelines, developments are projected to accomplish any which is additional rigorous. If less rigorous stages or methods are suitable in the interpretation of certain development conditions, a comprehensive and exhaustive explanation for any planned option is required as of the onsite precise environmental assessment. This validation must exhibit that the selection for any optional performance level is considerate of human health and the environment (IFC, 2006).

According to Rode (2016), Milder (2015) and Higman (2013), of particular relevance to biodiversity conservation is Performance Standard 6 identifies that safeguarding and preserving biodiversity, sustaining ecosystem services, and protecting existing natural resources is essential to sustainable development. The requests outlined in this Performance Standard have been directed by the CBD. According to Durning *et al*., (2017) and Cardinal *et al*., (2013), the environmental and social risks and impacts identification process determines the application of Performance Standard 6. The client's Environmental and Social Management System (ESMS) informs and guides the actions needed to meet the requirements of the Performance Standard. According to Suter (2016), Bernabou (2014) and Rosa (2015), having considered the risks and impacts, the Performance Standard is applicable to developments situated in modified, natural and critical habitats that have a likelihood of impacting on or depending on ecosystem services that the client has the power to manage, as well as on projects that include the generation of living natural resources like agriculture, fisheries and forestry.

According to Niner (2018), Ali (2018) and Joao *et al*., (2011), biodiversity conservation and management also involve the use of the mitigation hierarchy, more specifically the biodiversity offsets. These are usually used as a last viable option after all the prevention, minimisation and restoration measures have been applied and there are residual impacts. Biodiversity offsets conservation outcomes involve compensating for significant residual to

accomplish quantifiable conservation results that can sensibly be anticipated to achieve no net loss and rather a net gain of biodiversity; however, a net gain is needed in critical habitats. The planning of a biodiversity offset must observe to the "like-for-like or better" principle and should be executed in line with key accessible data and existing practices (IFC, 2006).

The principle of "like-for-like or better" shows that biodiversity offsets should be structured to protect similar biodiversity assets that are being impacted by a project. In some instances, areas of biodiversity that are affected by development could be of national or community value, therefore similar areas with same biodiversity components should be a priority for conservation even where they are under threat, hence they need thorough management. In such circumstances, it is wise to opt for an offset involving swapping (i.e. where the offset aims for the biodiversity of higher priority than the impacted by the project) as for critical habitats; it will meet the requirements of Performance Standard 6. If a client is planning the design of an offset as a restoration method, sourced specialists with familiarity in offset design and application should be used (IFC, 2006).

In a case where a client is buying from a primary producer, especially what is not to be produced in the areas where there is a significant modification of natural ecosystems or critical habitats, this has to be included in the ESMS to assess the primary suppliers. The verification process can detect the origin of stock and the habitat type of the area of production. According to Willard (2012), the client will arrange a continuous assessment of the client's main supply chains, minimise sourcing from suppliers that prove they are not adding to the substantial change of natural and/or critical habitats (this can be shown by supply of certified product, or effort towards verification or certification under a reliable scheme in certain commodities and/or locations). Furthermore, Porter et al., (2006) and Smith (2003), it necessary, call for actions that will lead to the client over time changing his contractors to those that can prove to be not responsible for the substantially affecting the environment. The capacity of a client to entirely deal with these threats will depend on the client's level of influence and dealing with his key suppliers (IFC, 2006). Biodiversity impacts arising from project development and persisting even after appropriate avoidance, minimisation and restoration measures have been applied. A biodiversity offset should be tailored and used.

2.3 Contextualising the literature: Developed countries 'perspective of environmental legislation in sustainable mining practices

Developed countries in contrast to developing countries or countries in the south are characterised among others by wealth accumulation, relatively high economic development, high level of health and literacy. Furthermore, developed countries have well established and organised institutions including civil societies and environmental organisations. However, up until recently, developed countries were the primary natural resources consumers and the primary environmental polluters (Paul and Kiki, 1991). For these reasons, they are at the forefront of international and global environmental issues (Hunters, Salzman and Zaelke, 1998). Therefore, in this section, the use of environmental legislation in sustainable mining practices of two developed countries where mining has played an important role in its socio-economic development is analysed.

2.3.1Canada

The environmental management mandate of Canada's government exists at both the provincial and federal level since 1970. According to Hilson (2000) and Meek (1996), the principal environmental regulation of Canada is the Canadian Environmental Protection Act (CEPA) proclaimed in 1988 which applies to the protection of the environment and health of Canadians through a comprehensive regime to control toxic substances at every step of their lifecycle. Among relevant Canadian federal environmental regulations, the ones affecting the mining sector are the Clean Air Act (1971), Clean Water Act (1972), Fisheries Act (1972), and Environmental Contaminants Act (1975). Furthermore, according to Hilson (2000), the Department of the Environment is responsible for ensuring that the environment is adequately protected and conserved. As a result, they put in place guidelines and standards that are consistent with the spirit of the legislation (Hilson, 2000).

Specific to the mining sector, Canada is among the pioneers in the world to consider the sustainability of mining. The starting point for Canada's approach to sustainable mining is the introduction of sustainability principles into Canada's mining policies and programmes (Government of Canada, 1996). After the introduction of sustainable development principles into Canada's mining policies, Canada's federal government has

faced significant challenges in translating sustainable mining concepts into a workable policy framework with measurable policies (ibid.). Therefore, according to Hison, (2000) stressed that in 1996; the federal government of Canada successfully adopted and implemented the Government of Canada's Minerals and Metals Policy: Partnerships for Sustainable Development. This policy is intended to lay the foundation for a governance approach to the mining sector. Essentially, according to Prno *et al.*, (2012), Adams (2008), Jickling *et al.*, (2008) this policy defines the structure, responsibilities, roles, objectives and strategies of the government for sustainable mining development. In 2008 the Federal government of Canada approved the 2008 Federal Sustainable Development Act of 2008 with greater emphasis on the principles of sustainable development for the efficient use of natural resources and the promotion of the socio-economic well-being of Canadians. The essence of this legislation was to put more emphasis on the need to equate environmental, social and economic priorities in mining projects (Sustainable Development Canada, 2010).

Furthermore, according to Jenkins and Yakovleva (2006) in 2004 the Mining Association of Canada (MAC) made a commitment to responsible mining called Toward Sustainable Mining (TSM). According to Fritzpatrick *et al.,* (2011) TSM is a set of tools and regulations put in place to ensure the effective management of mining risks and show leadership through engagement with local communities, leadership in the world best practices, and commitments to the safety and health of employees and surrounding communities. Thus, the TSM's primary objectives are to enable mining companies to meet the company's mineral and energy needs in the most socially, economically and environmentally responsible manner which is in accordance with the fundamental strength of accountability, transparency and credibility.

According to Revuelta (2018), notwithstanding Canada's introduction of sustainable development principles for the management of the mining sector, according to available information, the Canadian mining development projects in developing countries are not subject to the same principles and standards (Himley, 2010a; Revuelta, 2017 and National Report of Canada at CSD-18/19). While mining activities have been the source of economic growth, social benefit and infrastructure development they have failed to provide sustainable benefit to local communities that have been affected in their region or location (National Report of Canada at CSD-18/19). This report reveals the dual standard of the sustainable mining approach of large companies around the world.

.3.2 Australia

According to Australia (2009); Basu and Baafi (1999) Australia is one of the largest copper producers in the world, and the mining industry contributes significantly to the country's GDP. According to Environmental Australia (2008) report, minerals and energy accounted for 47% of merchandise exports and 37% of total exports, and its contribution to the country's wealth over the past 20 years was valued at $500 billion. Regardless of its contribution to the country's development, mining in Australia faced significant environmental challenges such as tailings discharges into streams, seasonal floods and acidic waters, the collapse of heaps of tailings and sterile, soil contamination. As a result, the Australian government has recognised the fundamental importance of viewing the health of the natural environment as the keystone for the economy, society and ecology. According to Welford (2014) and Barnejee (2008) from this approach, Australia has developed a strategy called the National Strategy for Ecologically Sustainable Development (ESD). ESD focuses on good governance and effective management of renewable and non-renewable resources (Mejia, 2013 and Moldan et al., 2012).

The effectiveness of environmental governance in Australia is based on the precautionary principle contained in the ESD. In order to identify and develop best practice strategies for environmental management in the mining sector, the Australian Department of Environment has partnered with the mining industry and emphasises the importance of environmental impact assessments (EIA). Furthermore, Frank *et al.*, (2010), Solomon (2008) and Golob *et al.*, (2007), mining best practices in Australia were formed through consultations and partnerships between the Australian Government's Department of Environment, and the mining industry. Furthermore, Australia and the mining sector have adopted the concepts of sustainable development as defined by the Brundtland Report (1987) and refined by the 1992 Rio Summit. According to Burkeland (2012) and Mudd (2010), Australia's approach to sustainable development is based on the fact that it is necessary to minimise environmental damage by improving the planning, management and rehabilitation of the environment in the mining and energy sector. However, all environmental achievements must be communicated to the public (Environmental Management in Mining Best Practice, 2002). Australia has also put in place a Water Management System (WMS) to prevent water contamination through the use of chemicals and other mining practices (ibid).

In 2006, the strategic management of water in the mineral industry was created, with the aim

of promoting better management of water resources in mining and it was considered a vital asset for all. Subsequently, according to Ghorbani (2017), in 2014 the government passed the Water Accounting Framework for the Mining Industry law that calls for all mining projects to be transparent and consistent about their approach to water measurement. Therefore, mining companies should make efforts to understand the nature and sensitivity of their surrounding environment.

In conclusion, the sustainable mining approach in Australia focuses on the EIA, and that the mines should be constructed as planned and approved by the government. As a result, regular monitoring and environmental auditing should be done by well-trained personnel throughout the life of the mine to assess performance and implement improvements where necessary. Also, obtaining a social license to operate has become a prerequisite for creating a business-friendly environment (Prno, 2013; Thomson and Boutelier, 2011; Prno and Scott Slocombe, 2012). Furthermore, according to Schaltegger (2017) and Turkey (2009), it is important to know that, this approach has also led to the concept of corporate social responsibility, which has grown in scale and is increasingly linked to the concept of sustainable development to ensure that environmental and community issues are adequately addressed. Hence, according to Epstein (2018) the Australian sustainable mining practices approach in four gradual steps interlinked are as follow: (i) Only revenue maximising; (ii) Efficient: enhancing performance through individuals' activities; (iii) Effective: improve benefit and performance through connectivity with the environment, communities and industry; (iv) Sustainable: embedding sustainability in all decision making and business practices to consider the economic and environmental needs of current generations without compromising the needs of future generations.

2.4 Contextualising the literature: A developing countries 'perspective of environmental legislation in sustainable mining practices

Developing countries are also referred to as countries of the south. They are characterised by poor large populations, high illiteracy, poorer life expectancies, and poor socio-economic infrastructures. In contrast, many developing countries have rich natural and minerals resources but lack general technical and scientific knowledge as well as legal and economic expertise required for the development of a given country. Furthermore, developing countries are characterised by poor government institutions which are under-

staffed and managed in some cases by unqualified government officials. In some developing country, the environmental concerns are not given much attention because the focus is on poverty alleviation which is sometimes to the cost of the environmental quality.

Therefore, in order to address the lack of legislation in developing countries, a number of international declarations must be considered. For example, according to Elliott (2004, 1998), principles 9-12 of the Stockholm Declaration of 1972 stated that many environmental problems in developing countries are caused by underdevelopment, therefore, they must include access to aid, technology and other forms of assistance. In the same way according to Beder (2013) and Clemencon (2012), Principle 3 of the Rio Declaration 1992 reaffirms the right to development by emphasising in Principle 5 the significance of eliminating poverty and paying particular attention to the needs of developing countries in Principle 6. Principle 7 highlights the particular responsibility in view of the pressure that societies of developed countries place on the global environment based on their technological and financial resources at their disposal.

Agenda 21 chapters also address many challenges faced by developing countries such as changing the consumption patterns with particular emphasis on actions that developed countries must play on financial resources and mechanism and technology transfer (Adger, Benjaminsen, Brown & Svarstad, 2001). In the same vein, Article 5 of the Montreal Protocol of 1990 focuses on a 10 year grace period which is given to developing countries before complying with a number of requirements. Furthermore, according to the Framework Convention on Climate Change emphasised on the right for any country to determine its own development priorities. Hence, Article 3.2 requires that specific needs and attention be given to developing countries.

Based on international declarations, the study analyses the manner in which two developing countries with a long history of mining activities for economic development have incorporated and adapted their environmental legislation for sustainable mining practices.

2.4.1 Chile

According to Castro and Sanchez (2003), Chile has a long history of mining activities, a well-developed copper mining sector and the world's largest copper producer, accounting for 56% of the $59 billion in total exports. According to O'Callaghan *et al.*, (2017) and the Chilean Copper Commission (2009), the estimated combined foreign direct

investment in the mining sector for the period 2009-2013 reached US$30 billion.

The basis of the sustainable mining approach in Chile is based on the country's constitution which states that "... sovereignty recognises a limitation in its exercise, the essential rights flowing from human nature and that State bodies have to respect and promote such rights, as guaranteed by the Constitution of September 11, 1980, and amended on August 17, 1989. Chile's sustainable mining development approach is also based on the 1994 EIA system, which requires all mining projects to provide an Environmental Impact Statement (EID) or EIA (Maxwell, 2009). The relevance of the EIA process to sustainable mining in Chile is that the report must be submitted to the state authorities concerned, among other things, by the national water authority and the Ministry of Agriculture. Moreover, the EIA reports should be made available to the public for comments to which mining development must respond to before the commencement of any activities. Other critical aspects of the sustainable mining development approach in Chile are: according to Barelli (2012) and Ward *et al*., (2011) Convention No. 169 of the International Labour Organization (ILO) on Indigenous and Tribal Peoples that Chile has ratified is a binding legal document aimed at ensuring the participation of indigenous and tribal people and their consultation at all levels; The General Environmental Law of 1994 which led to the creation of the National Commission for the Environment and is responsible for coordinating the environmental policy; Ghorbani (2016) the environmental impact regulations of 1997; The creation of the Ministry of the Environment in 2010, which acts as an assessment and compliance agency and imposes a fine on all environmental offences; the introduction of a new law that obliges all mining companies to reduce their environmental and health risks related to the closure of the mine; According to Franks *et al*., (2011) and Kemps *et al*.,(2010)Some mining companies in Chile have committed to the principles of sustainable development and the International Council on Mining and Metals Sustainable Development Framework; according (Ghorbani (2017) Chile has also taken initiatives to promote environmentally friendly practices and has signed a Memorandum of Understanding with Canada on Cooperation for Sustainable Development of Minerals and Metals with Canada to encourage the use of environmentally sustainable technologies and practices in the mining sector (KPMG, 2016)

To counter the water and energy crisis, the Chilean government took some measures by elaborating the Water Code of 2005 and Energy Code by reducing energy supplies for

domestic use and the privatisation of the water resources of which private entities buy water from the government in bulk to resell on the market. As a result, without water and electricity, local communities can no longer remain in their homes (Alexei, 2009).

2.4.2 South Africa

According to Keeley *et al*., (2014) and Sadla *et al*., (2012) The South African case study for environmental legislation for sustainable management of the environment and the mining sector is young but advanced in the formulation and implementation process compared to other sub-Saharan countries. Therefore, La Feri (2010) and Strydom *et al*., (2009) the basis of sustainable mining practices in South Africa is found in the Constitution of the Republic Act 108 of 1996 which provides for the protection of the environment from the activities of harmful substances. Article 24 of the Constitution provides that:

(i) Everyone has the right to an environment that does not affect his health or well-being; and

(ii) To protect the environment for the benefit of present and future generations by taking reasonable legislative and other measures that:

a) Prevent pollution and ecological degradation;
b) Promote conservation and;
c) Ensure sustainable ecological development and the use of natural resources while promoting justifiable economic and social development.

Article 24 of the South African Constitution sets the standard for environmental governance for the benefit of present and future generations, but it also specifies that all acts of mining must contribute to the socio-economic development of local communities. More so, South Africa has recognised that the potential impact of mining activities on landscape change subsequently affect the natural habitat, populations, communities and ecosystems (Sakoane, 2005). Thus according to Sutton *et al.*, (2007) mining can have a significant adverse impact on the environment, and the role of emerging legislation in shaping the performance of mining companies in South Africa is of utmost importance. The Constitution of the Republic of South Africa (Law No. 10 of 1996) defined the approach to environmental rights and governance to ensure that the principles of sustainable development are promoted in all development projects.

According to Muiu *et al*., (2009) and Scott and Oelofse (2005), the formulation of South Africa's environmental policy began in the late 1980s and early 1990s with the development of the Integrated Environmental Management (IEM) procedure. According to Redclift (2005) and Morgan (2012), South Africa has sound environmental legislation that promotes sustainable development that supports public participation, impact assessment and environmental management.

Environmental management standards are formulated in the White Paper on Environmental Management published on July 28, 1997 with the vision "to unite the South African people in a society where all people have enough food, clean air and water, houses and green spaces in their neighbourhoods, allowing them to live in spiritual, cultural and physical harmony with their natural environment". The focus of the White Paper is to insist on the role and vision of government institutions to ensure that all mine development activities promote the rights of all citizens to a clean environment. Therefore, according to Geissdoerfer *et al*., (2017) and Loorbach (2010) this vision can be achieved through a new model or paradigm of sustainable development based on integrated and coordinated environmental management. The 1997 White Paper on Environment Management proposed a paradigm for promoting the health of the environment and the well-being of all South African citizens by addressing the following issues: The quality of life of people and their living environment and daily work; Equitable access to land and natural resources; The integration of economic development, social justice and environmental sustainability; More efficient use of energy resources; The interaction between population dynamics and sustainable development principles; The sustainable use of social, cultural and natural resources; Public participation in environmental governance, and the preservation of the country's environment.

According to Lorek (2013), Gibson *et al*., (2013) and Prior *et al*., (2012) it is clear from the White Paper on the Environmental Approach that the country intends to promote sustainable mining and the use of natural resources for the promotion of the well-being of the community. However, a significant adverse impact of mining is still ongoing, and the local communities are still complaining about the socio-economic injustices in the mining sector, for example, the case of Marikana. Furthermore, the significant environmental impacts on mining occurred before the enactment of the 1996 Constitution. In this regard, Sutton *et al*.,(2007) argued that the mining sector has led to significant legacies for citizens to bear

and the state to overcome.

In order to put in place, the White Paper on the Environment Management, the Constitutional Law for a Clean Environment and the well-being of all citizens, the Ministry of Environment and Tourism (DEAT) promulgated Act No. 107 1998 on environmental management. According to Higman (2013), Brown *et al*.,(2009) and Kemp *et al*.,(2005) it has incorporated the principles of sustainability and good governance into a policy document that sets the standard for environmental management and places the needs of people at the centre of development projects. The National Environmental Management Act No 107 of 1098 contains 18 environmental principles that should guide administrative and judicial decisions in the area of environmental management (Khoza *et al*., 2007 and Sutton *et al*., 2007: 91). NEMA Article 2 (4) (a) recognises the possible negative impacts of development but advocated a risk-averse approach for any impact identifies, anticipated, and avoided as far as possible or minimised and corrected.

According to Elbra (2017) and Sutton *et al*., (2007) specific to the mining sector, is the Mineral and Petroleum Resources Development Act (MPRDA) (No. 28 of 2002), which gives effect to section 24 of the Constitution by ensuring that mineral and petroleum resource extractions in the country are conducted in an orderly and ecologically sustainable way while promoting justifiable social and economic development. Furthermore, Redclift, (2005) argues the Minister of Mineral Resources is responsible for the implementation of the MPRDA and ensures the sustainability of the South African mining and oil industry under NEMA and promotes socio-economic development.

According to the South Africa Department of Environmental Affairs (2013), South Africa has put in place sound environmental legislation to promote sustainable development, which includes laws that promote public participation, impact assessment and environmental management. An excellent example of a piece of legislation that ensures sustainable management is the Minerals Act of 1991 stipulates that mining companies must submit an annual Environmental Management Programme (EGR) Performance Appraisal Report to the Government to monitor compliance levels. Also, according to Article 19 of the National Water Law of 1998 (RSA, 1998), companies are held responsible for any pollution on their property.

2.5 The challenges of environmental legislation in the mining practices of developing countries

The concept of sustainable mining practices in developing countries is still in its infancy stage and has to overcome many challenges to mature. Mining activities have been identified as a critical sector with the high potential to help developing countries develop their economies and reduce poverty. Nevertheless, according to Stead *et al.,* (2014) and Idowu *et al.,* (2013) many challenges must be overcome in order to achieve sustainable management of the environment and sustainable mining. The study grouped the challenges in terms of economic, social and environmental.

2.5.1 Economic challenges

According to McMichael (2012), Escobar (2011) and Slack (2009) policy-makers as well as international policy advisers under the influence of neoclassical economic theories have encouraged mining development worldwide and especially in developing countries, with the belief that it will contribute to increasing production, export income, tax revenue and reduce unemployment. Furthermore, Ross, 1997, 2004, 2008; Stevens, 2003 it has been assumed that economic growth will have an impact on reducing inequalities in income distribution. However, in many developing countries such as the DRC, regardless of the abundance of mineral deposits and increased foreign direct investment, these have not translated into economic prosperity.

Crowson (2009) and Ross (2008) both emphasised that independent of the mineral-rich deposit and economic growth, poverty and inequality have increased. Also, the mineral wealth of many developing countries such as Algeria, Angola, Colombia, Nigeria and the DRC has resulted in armed conflict, corruption, increased country risks and reduced foreign investment (Ross, 2004; Ross, 2008). Therefore, mineral wealth is called a "resource trap or trap of inequality" (ibid). What characterises the lack of positive economic outcomes of mineral resource investments in many of the developing countries mentioned above is poor governance, political interference and economies by some elites who, in many cases, have led to poor management of the mining sector and predatory behaviours (Stevens, 2003).

According to Kirsch (2010), in order to achieve sustainable mining, the government has an important role to play. It is for this reason that, Szablowski (2007) and the World Bank and International Finance Corporation (2002) note that governments are encouraged to control

mineral resources and the mining sector. However, government control can quickly lead to administrative or bureaucratic excesses and corruption among state officials which often leads to the trap of mineral inequality (ibid). Furthermore, according to Szablowski, (2007), the lack of political will and corruption also makes the situation of trying to change very difficult as they are required to change economic, social and political practices.

2.5.2 Environmental challenges

Mining involves the extraction of economically valuable minerals by developing excavations and processing the ore. This means that the environments in which these operations take place are vulnerable to any form of environmental degradation that must be overcome by sustainable mining practices. The MMSD (2002) report on mining activities notes that mining activities always start with digging and removing arable land, including fertile land, and all vegetation with its biodiversity. Which is the reason why the current models of mining and mineral production have had a significant impact on the local community and the environment? (Frank *et al*., 2010; Worrall et al., 2009; Giurco *et al*., 2012) Also, the magnitude of the impact continues to increase as production increases and ore quality declines.

The decline in ore quality means that more ore must be mined to achieve the quality required for metals (Topp *et al.*, 2008). As a result, the need for more ore means increased waste rock production and greenhouse gas impacts per tonne of product (Mudd, 2007). Furthermore, according to Schiavi (2013) and Moran *et al.*, (2014) mining activities have created an unacceptable legacy of social and environmental impact in the long term in many parts of the world and the impact ranges from geographic and cultural displacements of indigenous communities to contamination of water, air and land with toxic by-products. Furthermore, MMSD (2002: 234) states that "mining generates a variety of waste materials, including overburden, waste rock, tailings and heaps of leached ore". Thus Brian et *al.*, (2010) analysis of natural and environment identified different types of mining impacts that must be addressed during activities and propose actions to be considered in order to achieve environmental sustainability (**Figure 2.3**).

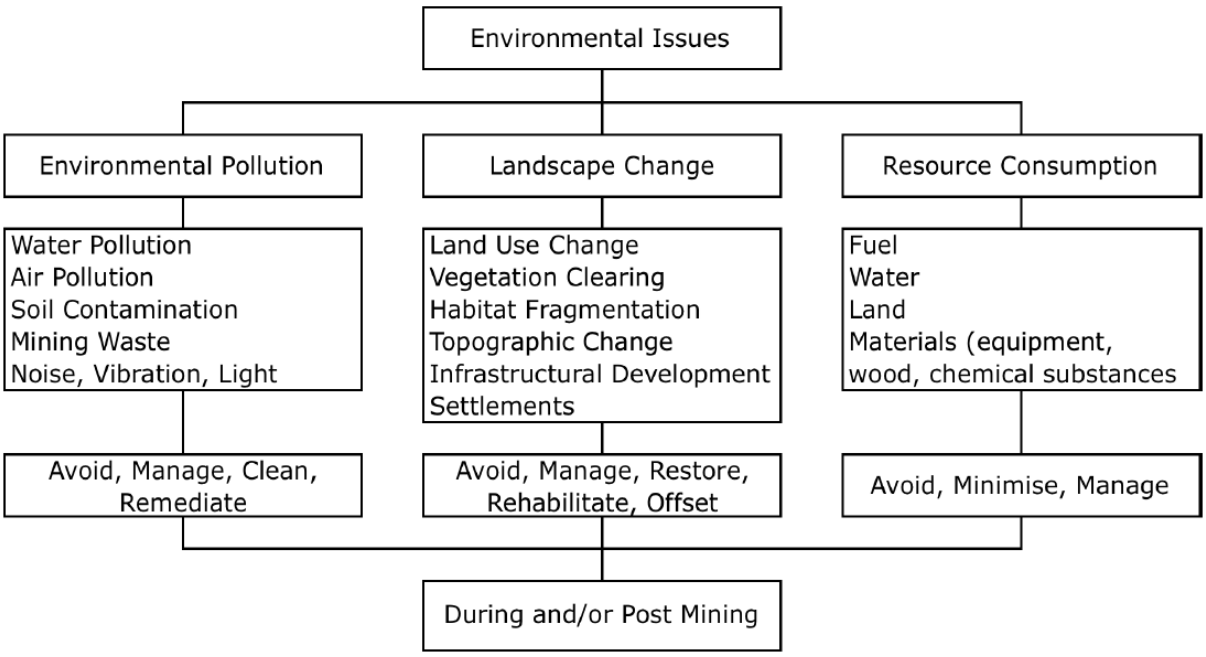


Figure2.3: Mining environmental impacts and proposed solution (Brian et al. (2010)

Reed (2002) notes that, in developing countries, the primary cause of environmental degradation caused by mining activities is poor mining practices, lack of public funding, and the lack of professional and technical capacity to mitigate mining problems. More worrying is the fact that some governments ignore specific negative environmental consequences (MMSD, 2002; Tarras- Wahlberg, 2002; Tarras-Wahlberg and Nguyen, 2008).

2.5.3 Social challenges

Mitchell (2001) stressed that given the complex nature of society and the effect of the economy on the natural environment; it will be difficult to measure the negative social impacts of mining activities. According to the MMSD report (2002), the impact of mining can be classified as social, cultural and political. Indeed, mining activities generally take place in remote areas where socio-economic infrastructure is limited. As a result, mining development leads to migration of the population to the area, which can lead to social problems due to overpopulation (MMSD, 2002).

Ross (2004 and 2008) emphasises that population growth still affects local capacities and resources such as the health care system, education, police, and water supply. Also, the

increase in population will lead to higher market prices that most local communities cannot afford because many local communities in the mining areas are poor.

Furthermore, it is important to note that mining activities attract more men than women, which can lead to prostitution and alcoholism (MMSD, 2001). As a result, some diseases that were not part of the community, such as HIV and AIDS, can occur due to overcrowding and prostitution (MMSD, 2001). Other social challenges are related to the violation of employee rights and negligence to their health and safety. Thus according to Martin (2006), social challenges in the mining sector if not well managed can lead to social conflicts between the mining company and the local community. In some cases, displacement and resettlement in the community can also create new social challenges for the displaced community and the receiving environment. Haselip & Hilson (2005) and Rockloff & Lockie (2006) concluded that local and indigenous populations are often marginalised and disadvantaged as a result of the mining development projects in their regions.

2.6 Knowledge gaps and relevance of the study

The literature review shows that the issue of sustainable development in mining activities has been extensively discussed globally. So far, the primary concern has been the integration of economic, social and environmental considerations in mining operations. Furthermore, according to Ali *et al*., (2017) and Kirsch (2010), the principles of sustainable development should be taken into account in the decision-making process and create a balance between the three factors of sustainable development. It is for this reason that the study was conducted. One of the objectives of the study in the Katanga Copper Belt was to identify how the application or administration of environmental legislation can contribute to advancing the application of the concept of sustainable development in mining and contribute to community development. The study examined the environmental legislation administration approach and challenges that have hindered the administration of environmental legislation in promoting a sustainable mining practice. Indeed, one of the missing links in the literature is the practical steps and systems for decision makers to take into account and integration of the concepts of sustainable development from concept to execution. Environmental Legislation provides guidelines for mining that, if observed, should result in sustainable mining practices in the Katanga Copper Belt for economic growth, job creation and poverty reduction. Environmental laws and regulations are put in place to limit the amount of water, air and land pollution caused by mining activities as well

as to prevent any form of development on the vulnerable environment. The study examines in more detail how EL promotes the constitutional right to a healthy environment for local communities and encourages their participation in the decision-making process.

Thus according to Birkland (2015) and Musso (2000), the effectiveness of environmental legislation implementation in the mining sector has produced more positive results in developed countries than in developing countries. The study aims to contribute to the formulation and administration of environmental legislation for the promotion of sustainable mining in the Katanga Copper Belt and developing countries as a whole. Developing countries are characterised by poor governance and corruption which result in significant negative impacts on the local community and the environment (Giurco *et al.*, 2012). More importantly, local communities do not benefit from mining revenues. The study proposes a management approach to ensure that mining revenues benefit the local community in a healthy environment.

2.7 Chapter conclusion

This chapter places the study into the broader disciplinary literature on the central themes and issues arising from the study. The central themes and issues are environmental legislation, mining, sustainable mining and sustainability, local community development and sustainable environmental management of the mining sector (Meyers (2018). It has been shown in this chapter that environmental legislation has an important role to play in the mining sector. Although the mining sector and mining activities have played an important role in the development of humanity, they are still relevant and essential for the development of developing countries with mineral resource economic bases, and the Katanga Copper Belt in particular. However, the mining sector is also one of the biggest contributors to environmental degradation in the areas where it is taking place.

In this chapter it was shown that it is possible to conduct mining activities which are safe, use resources efficiently, focused on economic growth, promote community development and protect the environment for future generations. Nevertheless, Idowu (2013) in the current global economic context, it is important to take into consideration the concept of sustainable development to balance the needs of today's generation without damaging the possibility for the next generation to survive. Therefore, this chapter demonstrated the model outlining the concept of sustainable mining practices which incorporate the economy,

environment, community, safety, and efficiency.

It has been shown further in this chapter that the incorporation of sustainable development principles into environmental legislation and policies for sustainable management of the environment is not enough to promote sustainable mining practices. The promotion of sustainable mining will require the administration of environmental legislation through efficient government institutions and qualified human resources for implementation, monitoring, and evaluation. This means that environmental legislation requires good governance of the mining sector for sustainable management of the environment and sustainable development of local communities. Nevertheless, Mayda's (1985) literature illustrates that developing countries would be able to solve their environmental problems through environmental legislation. However, particular attention must be given to the conceptual and application approach to avoid promoting only one aspect of sustainability such as promoting only the economic gain of the country and not considering the protection of the environment. Therefore, there is a need for the DRC to adopt and put in place environmental legislation and policies that balance the economic needs of the country and the protection of the environment as well as community development.

CHAPTER THREE

AN IMAGE OF THE STUDY AERA: HISTORICAL AND CONTEMPORARY PERSPECTIVES OF ENVIRONMENTAL LEGISLATION ON MINING ACTIVITIES IN THE KATANGA COPPER BELT

3.1 Introduction

The objective of this chapter is to present a general overview of the geographical and socioeconomic characteristics of the study areas in which the study was conducted. This chapter is divided into three sections. The first section presents a profile of the DRC. This section also provides geographical and socio-economic characteristics of the DRC. The second section introduces the Katanga Copper Belt as the primary study area. The third section briefly discusses the Katanga Copper Belt, outlining its geographic context, including its history of mining development, how it shaped the region, including the development of environmental legislation. It should be noted that the primary purpose of this chapter is to present the country and geographical location of the study area in order to facilitate a better understanding of the unsustainable environmental and socio-economic conditions in which the study was carried out for future sustainability.

3.2 Country profile of the DRC

The DRC is located in the centre of the African continent and covers an area of 2,345,409 km^2 for approximately 86,790,567 million inhabitants (UN World Population Prospects Revision, 2019). It shares borders with nine other African countries which are Rwanda, Uganda, Burundi, Tanzania, South Sudan, the Central African Republic, Zambia, Angola and the Republic of Congo (Kibasomba, 2005). The land use distributions are, 11.4% of agricultural land (3.1% of arable land, 0.3% of the permanent crop, and 8% of permanent pasture), 67.9% of forest and 20.7% for other land use (Ickowitz et al., 2015).

The fragile economy of the DRC resurfaces after years of conflict and instability (Kibasomba, 2005). However, 87.7% of the population still lives in poverty, unemployment

rates exceed 45%, and public institutions are weak (Vlassenroot and Raeymaekers, 2004). Mining activities are the driving force behind growth, public sector investment, agriculture and manufacturing which expand the economic base (Perks, 2011).

The country mineral resources include diamonds, gold, tantile, copper, cobalt, tin, manganese, lead, zinc, coal, uranium and oil (Botula et al., 2012; Cuvelier, 2011; Geenen, 2014). According to Cuvelier (2011), the DRC is the world's largest producer of cobalt and the world's fifth largest copper producer. However, the agricultural sector employs more than 70% of the population and contributes more than 40% to the national GDP (Ickowitz et al., 2015). Due to poor governance and weak government institutions over an extended period, the DRC was considered a "failed state". While other researchers described the DRC as "the heart of darkness" in Africa, it has become an "abandoned black hole" characterised by calamity, chaos, confusion and a bizarre form of social cannibalism where society is its prey "(Trefon, 2004).

However, a closer look on the ground indicates a reality that shows something different and a sophisticated arrangement. Trefon (2004) pointed out that "although it seems to lack all the requirements to qualify it as a functional state, the Congolese political system persisted in the most surprising way even during periods of apparent institutional collapse". Raeymaekers (2007) argued that the DRC's "surprising propensity to resilience", political and institutional, reveals a significant change.

Even though state institutions collapsed, many government officials remained in place, but with a more fixed mindset and goals of self-service and personal enrichment (ibid.). Trefon (2004) notes there are "new forms of the social organisation...to compensate for the overwhelming failures of the post-colonial nation-state". As a result, the failure of state institutions has created a vacuum in state governance in many sectors of state institutions while new actors have seized the opportunity to fill the void left by the central government (Caspersen (2013) and Tull (2005). These new actors are armed groups (military contractors, rebel movements, ethnic militia, and the military) operating in mining areas and involved in various traditional state responsibilities such as tax collection (Kibasomba, 2005). In 2015, the number of territorial provinces increased from 11 to 26 under the Constitution of the Republic of 2006 (Tull, 2018). The territorial subdivision of the first 11 provinces was carried out with the aim of improving the capacity of state governance and the urban socio-economic development infrastructure. The central

government plans to bring the administration of the community closer to reduce poverty in the country. Thus, the former province of Katanga which covers the entire Copper Belt of Katanga is now subdivided into four territorial provinces, Haut-Katanga, Lualaba, Haut-Lomami and Tanganyika (Banza et al., 2009; Geenen, 2012). The provinces are subdivided into districts, territories, sectors, chiefdoms, groups and villages.

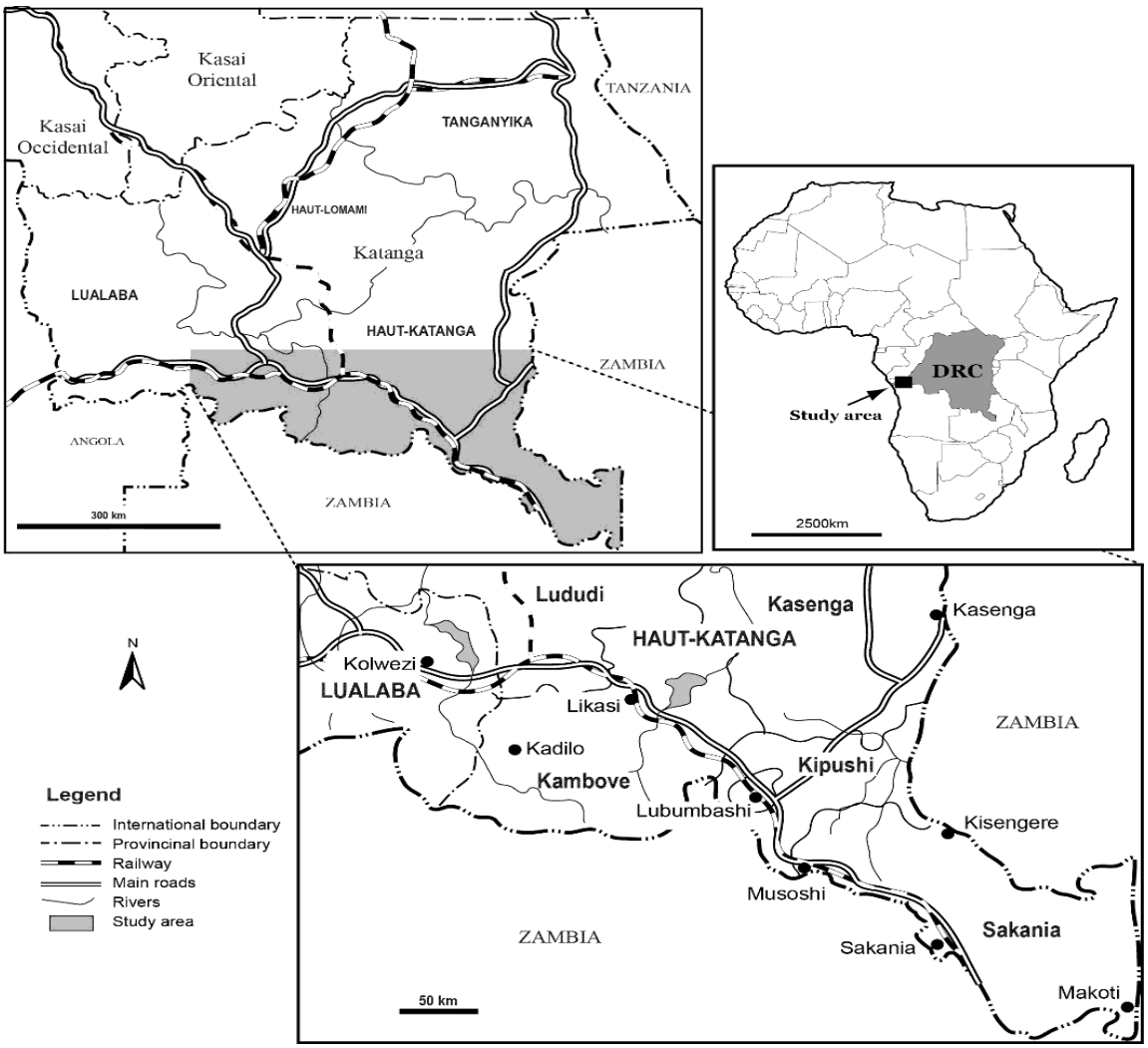
3.3 Study area: The Katanga Copper Belt

The research focuses on the Katanga Copper Belt of the DRC which is located in the southwestern region of the DRC and covers three territorial provinces (Upper Katanga, Lualaba and Upper Lomami). It is characterised by a dry and wet season, with rainfall of about 49 inches per year (120 cm) (Cuvelier, 2011; Perks, 2011). In some parts of the Katanga Copper Belt, rainwater is a source of water for some households (Cuvelier, 2011). However, unregulated mining leads to acid rain and the loss of agricultural land in some parts of the study area (Amisi, 2010). The Katanga Copper Belt is home to some of the largest producers of copper and cobalt such as,

(i) Gécamines (GCM): A state-owned copper-cobalt mining company that held a monopoly over mining concessions in the region;
(ii) Katanga Mining Ltd: Which operates significant mining complexes in the region, producing refined copper and cobalt;
(iii) Tenke Fungurume Mining: Previously held by the US and Canadian consortia as majority shareholders and therefore sold its controlling interest to a Chinese shareholder;
(iv) Ivanhoe Mines: Initiator of the Kamoa and Kakula projects, which are currently owned by Ivanhoe Mines, Zijin Mining Group Co. Ltd and the DRC government.

Figure 3.1 below illustrates the geographical location of the Katanga Copper Belt along with the main cities. Note that the mining development is spread over the entire Copper Belt with a high concentration of activities around the city of Lubumbashi (the southern group), Likasi (the central group), and the Kolwezi (the western group).

Figure 3.1: Katanga Copper Belt location



Source: Cartographic Unit (2016), School of Geography and Environmental Studies, University of the Witwatersrand, South Africa, and Field Survey (2015).

Jules Cornet revealed the first geological map of the Katanga Copper Belt and the vast mineral deposits of the area (Perks, 2011; Pourret et al., 2016). However, the mineral deposits were already partially exploited by the local indigenous population in the form of artisanal mining (Perks, 2011). According to Amisi (2010), Jules Cornet first referred to Katanga as a "geological scandal" and as a "copper country".

3.3.1 Socio-economic information

The socio-economic characteristics of the Katanga Copper Belt are related to mining to mining development activities (Banza et al., 2009; Cuvelier, 2011). The primary economic

activity in this region is mining which concerns the overall financial performance of the economy. According to Perks (2011) artisanal mining has become one of the most lucrative sources of economic activity for many unemployed local communities. Agriculture and livestock are concentrated on the Katanga plateau, while the eastern part of the region is rich in mineral resources with a large deposit of copper, cobalt, tin, radium, uranium and diamond (Geenen, 2012; Pourret et al., 2016). Most of the mining activities taking place in the study area are in the hands of foreign investors while the members of the local community are mainly engaged in artisanal mining (Ickowitz et al., 2015; Pourret et al., 2016). The mining sector of the Katanga Copper Belt is the backbone of the economy. Most of the secondary activities in the area were created to support the mining industry (Pourret et al., 2016).

According to Ickowitz *et al*., (2015) despite the abundance of natural resources and a relative increase in mining activities, mining revenues have not translated into a reduction of poverty and the majority of the local community live below the global poverty line. Furthermore, according to Cuvelier (2011) for a long time, Gécamines remained the leading employer of the Katanga Copper Belt. As a result of the decline in mining output and low demand for copper and cobalt, the Katanga Copper Belt socio-economic situation deteriorated. Pourret *et al*., (2016) argues that this situation began with the collapse of the Kamoto underground mine, which significantly affected Gécamines' production, and in turn revenue, due to the poor governance of the mining sector. As a result, the socio-economic infrastructure of the study area began to deteriorate critically, leading to a decline in the quality of life. Furthermore, in the early 1990s, the Katanga Copper Belt experienced a dark period of xenophobic attacks that drove out a large number of experienced Gécamines (GCM) workforces (Cuvelier, 2011). The combination of the collapse of the Kamoto mine and xenophobic attacks had damaged the region's economic capacity to generate revenue for economic growth and social development projects.

It should be noted that mining activities are the backbone of the socio-economic activities of the Katanga Copper Belt, as most of its socio-economic infrastructure has been designed and built to support the copper and cobalt mining industry. The best hospitals and schools in the study area were attached to and managed by Gécamines. Moreover, the number of public hydroelectric dams and sources of drinking water were partially maintained by Gécamines (Kalassa, 2016). Consequently, the collapse of Gécamines affected most of

the socio-economic activities of the Katanga Copper Belt (Cuvelier, 2011).

Nevertheless, since 2002, the Katanga Copper Belt has been experiencing a regeneration of the mining sector under the effect of strong demand for copper and cobalt. The regeneration of mining activities in the Katanga Copper Belt coincided with the liberalisation of the mining sector and the adoption of the 2002 mining code which offered exorbitant benefits and a high return on investment to foreign investors. As a result, most of the copper and cobalt reserves were sold to private investors through joint ventures with Gécamines. Therefore, the mining joint venture approach in mining development of the Katanga Copper Belt has rekindled the hope of many members of the community. Hence, many new mining companies have been started. These include Kamoto Copper Company (KCC), Mutanda Mining, Sicomine, Kamoa-Kakula, Anvil Mining, First Quantum Minerals (FQM), Chemicals of Africa (Chemaf), Ruashi Mines, Boss Mining, and Tenke Fungurume Mining (TFM).

The contribution of the mining sector to the development of the Copper Belt of the DRC and Katanga is essential. However, Mutinga (2010) pointed out that mining companies operating in the DRC operate in complete opacity. The majority of local communities are still living in poverty, and the natural environment continues to be degraded by unregulated mining activities (Kasongo, 2016). Regardless of this point of view, Roberts (2015) and Kippin (2008) argues that mining companies still play an essential role in the socio-economic development of the Katanga Copper Belt through the payment of taxes, wages, and social interventions in the form of Corporate Social Responsibility (CSR) actions. Even though the main study area is the Katanga Copper Belt which covers a large geographical space, the study was scaled down to two main cities of the regions, Lubumbashi and Kolwezi.

The choices for the two cities are related to the role that mining activities played in the birth and development of the two cities. Due to the large population and the size of the two cities, the study focus was scaled down to investigate 3 local community areas in Lubumbashi and Kolwezi (**see details in chapter 4**).

3.3.2 City of Lubumbashi

The city of Lubumbashi is the second most populous city in the DRC and covers an area of 747 $km^2$with approximately 5,000,000 people (Narendrula *et al*., 2013). Furthermore, It is divided into seven local municipalities including, Commune Annexe, Kamalondo, Kampemba, Katuba, Kenya, Lubumbashi and Ruashi (Narendrula *et al*., 2013).

It was created in 1910 by the colonial power under the name of Elisabethville which was changed to Lubumbashi in 1965 (Mujinya et al., 2011). The city of Lubumbashi was created by Emile Wangemee after the development of copper mines exploited by the Union Miniere of Haut Katanga (UMHK) and local communities called Kalukuluku, a name of copper foundry masters (Amisi, 2010). It was the discovery of the copper deposit that led to the creation of Lubumbashi to welcome European workers. The location of the first metallurgical plant was decided by Colonel Wangermee, under the technical advice of the Swiss engineer, Itten, to build the plant next to the stream of the same name, Lubumbashi (Mujinya et al., 2011). **Figure 3.2** mine waste of Gécamines and represents years of mining activities in the Copper Belt. It contained cobalt which is currently re-mined using new technologies.

Figure 3.2: Telling copper and cobalt waste under reclamation by STL (Katanga tourism, 2011)

The name Lubumbashi was inspired by the name of the watercourse called Lubumbashi which crosses the city and where the first metallurgical plant Gécamines Mills Lubumbashi was built (Amisi, 2010). The city of Lubumbashi and its surroundings are located in the upper part of the Kafubu basin. The average altitude is 1230m and the basin of the country is separated by the element of the vast African plateau and Zambezi River (Zambia). The city of Lubumbashi occupies the geosynclines of Lubumbashi, bounded on the east by the anticline of the Star and Ruashi, where the mining activities of the past and the current have degraded the quality of the natural environment (Geenen, 2012). To the west, it is bounded by Munkuen-lupoto and to the north by the Kafubu stream. The climate is a tropical Sudanian type with two alternating seasons, temperate and continental, which are related to its altitude and distance to the ocean masses (Mbenza, 1973).

The average annual rainfall is about 1200 mm, very localised and often falls in rather short showers. However, the precipitation is very acidic due to SO_2 emissions into the atmosphere (Mbenza, 1973). It should be noted that the cause of environmental degradation in Lubumbashi is complex and manifold (ibid). The average temperature is about 20 °C with the lowest being between 15.8 °C and 10 °C and the highest being between 22.5 °C and 38 °C. The city of Lubumbashi is characterised by a tropical climate with two rainy seasons from November to March with an average rainfall of 1228 mm of water. The type of vegetation is that of southern Katanga, characterised by a dense forest called Mahulu. The vegetation is different from the town of Kolwezi which is characterised by a dense and dry forest called Miombo, which has never stopped increasing over the years. Over time, the Miombo will give way to an anthropogenic shrubby savannah or herbaceous savannah (Amisi, 2010). This type of vegetation is often threatened by ecological drought (Leblanc and Malaisse, 1978).

Even though the city of Lubumbashi was created following the discovery of the mineral deposit, the primary economic activities are small businesses, mining, urban agriculture, and breeding. The majority of the local community works in the small businesses, both formal and informal, but only an estimated 25% of the population is directly or indirectly employed in the mining sector (City of Lubumbashi, 2016). Small businesses are mainly operating as mining subcontractor providing services such as transport, security, safety companies, labour suppliers and enterprises such as agribusiness, hardware, and building materials (Narendrula et al., 2012; Pourret et al., 2016). Nevertheless, mining activities

influence the money supply and economic activities because of they provide income to the residents of the city, credit financing for imports in the form of equity financing and credit for working capital in the form of shares (Cuvelier, 2011).

3.3.3 City of Kolwezi

The city of Kolwezi is located to the south of the DRC, west of the city of Likasi and 300 km from Lubumbashi (Mthembu-Salter, 2009). It is the administrative city of the new province of Lualaba and the hub of the copper and cobalt industry (Mukuna et al., 2018). In addition to mining activities, Kolwezi is also known as the agricultural centre of the Katanga Copper Belt, producing mainly maize, cassava and groundnuts. It borders the province of Haut-Lomami, the Republic of Zambia, the province of Haut-Katanga, the district of Lualaba and the Republic of Angola (Mthembu-Salter, 2009).

The Kolwezi mineral deposit is concentrated in an elliptical lens known as the Kolwezi Lambeau (Lunda, 2000). The additional morphological zones are, a rotating relief zone called the Nzilo promontory. This zone is characterised by different types of tributary rock (quartzite and metamorphic chests) related to Kibarien. The Lualaba stream played an essential role in the formation of the relief by deep gorges and rapid falls before reaching the Upemba Lake depression (Mthembu-Salter, 2009). The southwest side is characterised by the sandy highlands of Manika, Biano to the northeast, the Nzilo promontory to the south and the Congo Rivers cross the region in the form of a snake. An artificial lake covers the plain created by the Nzilo dam. There are two slopes slightly, interspersed with small reliefs that reach the valley of the Lualaba plateau.

According to Placet (1991) because of the geographical position of the city of Kolwezi which is located next to Lake Nzilo and its altitude being between 1000 m and 1500 m, the city knows a humid and temperate, tropical climate with an oceanic tendency. The city of Kolwezi is characterised by a long rainy season from September to April and a short dry season from April to September. Changes in weather conditions in the region are caused by variations in temperatures. The average annual temperature is 20, 1 °C with some variations between 6 °C and 8 °C. The minimum temperature is 20, 7 °C, and the maximum is 31'2 °C between September and October. The city has a minimum temperature of 6 °C between June and July (Freson (1993). The minimum rainfall is about 1225.2 mm (Kasongo *et al.*, 1998).

Mbeza's (1973) analysis of Kolwezi soil quality concludes that the soil type is relatively weak and ravaged by more than arboreal herbaceous species. However, the subsoil is rich in mineral resources (copper, cobalt, gold, uranium and radium). The city is located on the rich mineral deposit of Haut Katanga, and its existence is closely linked to the discovery and development of copper and cobalt mining by the Union Minière du Haut-Katanga which was later changed to La General des Carrieres et des Mines (Gécamines) (Mukuna *et al*., 2018). It was the increase in mineral prospecting at Ruwe (Mutoshi) between 1919 and 1929 that led to the creation of the city of Kolwezi in 1938 under the administration of Vikinock (Bwana Mafuta) based in Jadoville (Likasi) (Mthembu-Salter, 2009). The city of Kolwezi was developed with the aim of creating a European city to welcome European workers (Mukuna et al., 2018). As a result, the Katanga Special Committee and the Upper Katanga Mining Union agreed with Compagnie Foncière du Katanga to build the town on the Kolwezi plateau because of its proximity to the original settlements, the Mines of Musonoi and the Kolwezi Concentrator. The name Kolwezi comes from a stream called Kolwezi located near the Kolwezi airport. Today, most of Kolwezi's mining operations are joint ventures between the former state-owned enterprise Gécamines and multinational corporations. Among the biggest are Tenke Fungurume, Glencore, Kamoto Copper Company and Mutanda Mining (Narendrula *et al*., 2012).

The primary economic activity of the city of Kolwezi is centred on the mining of copper and cobalt (Mukuna *et al*., 2018). Thus every time the demand for copper and cobalt goes down, the economic activity of Kolwezi is paralysed. Furthermore, the mining sector is the largest employer. This includes formal and artisanal mining. Industrial exploitation of copper and cobalt ores coexist with artisanal exploitation. The majority of the artisanal miners sell their ore product to bigger companies that process it in their smelter. Along with the industrial mining activities, several other economic activities formal and informal have risen. These are mining subcontractors, general trade, agriculture (subsistence) and informal trade. However, due to past unregulated mining activities, parts of the agricultural land and housing were lost to artisanal mining, and the majority of the unemployed local community prefer artisanal mining activities (called "diggers" for quick cash (Mukuna et al., 2018).

3.4 Historical background: The development of the mining industry and environmental legislation governing the mining sector

The copper mining industry in Katanga started in the early 1990s thanks to the artisanal production of copper and iron known as the mangeurs de cuivre. Nonetheless, the Tanganyika Concession Limited (TLC) and the Katanga Special Committee (CSK) used a practice known as the file, which means searching for local mineral reserves. In 1900, the CSK granted the exploration right and the mining concession to a former close partner of King Leopold II, Robert William, a director of TCL. In 1901, Robert William sent a group of mining prospectors under the direction of Mr Greey and Mr Holland to the Katanga region and in 1903 they discovered the Kolwezi gold deposit, now known as Mutoshi. The exploratory mission discovered a deposit of gold and tin ore near the Busanga region. In 1906, when the prospecting right of CSK expired, King Leopold II signed in October 1906 a decree establishing the Union Minière du Haut- Katanga (UMHK) in order to lead the industrial exploitation of minerals discovered by TLC. However, the full mining industry development in the Copper Belt of Katanga and Kolwezi, in particular, took off dramatically in 1919.

Traces of ancient mining and metallurgical activities (iron and copper) dating from 400 AD have been discovered in the Katanga Copper Belt region (Vellut, 1981). As a result, analysis of the socio-economic life of the Katanga Copper Belt between 1900 and 1960 reveals three critical periods that have had an impact on the territorial and administrative division of the country (Vellut, 1981).

The first period is called the Leopoldienne period (1900-1908). During this period, King Leopold II was the sole owner of the Congo, which was known as the Congo Free State (ICS) (Jan (éd.) et al., 2018). Meanwhile, British companies and English-speaking staff (the United States, Australia, Britain and South Africa) played a significant role compared to Belgium in laying the foundation for mining development in the DRC (Jan (éd.) et al., 2018; Tull, 2018). Members of the local community were relegated to working mainly as slaves in the fields of agriculture, mining and railways.

The first exploration mining activity in the Copper Belt of Katanga was commissioned by Cecil Rhodes (Jan (éd.) et al., 2018). It should be noted that during the reign of King Leopold II, the mining sector of the Etat Independent du Congo EIC was mainly

controlled by the king and the Special Committee of Katanga (CSK), an institution created in order to control the interests of Belgium in the region and oversee the mining rights approval processes (Perks, 2011). The socio-economic development of the region was controlled and planned by King Leopold II (Geenen, 2012; Perks, 2011). Apart from the discovery of mineral resources in the region, no significant socio-economic development took place; most of the mining revenue benefited the king and his allies (Mthembu-Salter, 2009).

The second period began when the Belgian government took full control of King Leopold II's EIC and changed it to Belgium Congo. This period was characterised by private capital investments in the mining sector of the Katanga Copper Belt. During this period mining exploration occurred almost throughout the Katanga Copper Belt and was financed by private foreign investors (Banza *et al*., 2009; Cuvelier, 2011). However, financial interests and investments in the mining sector have never been accompanied by existing socio-economic investments for improving the well-being of local communities (Banza et al., 2009; Mwitwa *et al*., 2012). Also, this period is characterised by the discovery of tin reserves in Manono, the First World War and the creation of a large consortium, the Union Minière du Haut-Katanga (UMHK). The creation of the UMHK was followed by a significant migration of Europeans to the Copper Region of Katanga which led to the development of human settlements to accommodate European workers with little impact on the improvement of the social and economic life of local indigenous communities (Narendrula *et al*., 2013).

Industrial mining in the Katanga Copper Belt began in the mid-twentieth century under the initiative of the Belgian government, Société Générale de Belgique, Tanganyika Concessions Ltd, and UMHK. According to Buelens (2007: 197), the UMHK's struggle to get the mining activities and exploitation to take off the ground were due to the lack of qualified labour and the geographical situation which made accessibility very difficult. Nevertheless, full production of the mining operations took off after the completion of the construction of the railroad on the Atlantic coast (Katzenellenbogen, 1973). After the construction of the railway, the mining activity of the Katanga Copper Belt and the UMHK grew faster and became the world's largest producer of copper and cobalt (Perrings, 1979; Higginson, 1989; De Meulder, 1996). Most of the minerals extracted from the Katanga Copper Belt were sent to the UMHK metallurgical plants in Olen and Hoboken (Belgium)

for further refining. The fact that some of the ore refineries were based in Europe slowed the industrial development of the Katanga Copper Belt. Furthermore, during this period mining activities were characterised by the absence or less consideration for health and safety of indigenous workers as well as the socio-economic development of local communities. The working conditions of local communities are illustrated in **Figure 3.3**, which shows fewer considerations of the local community rights to better working conditions.

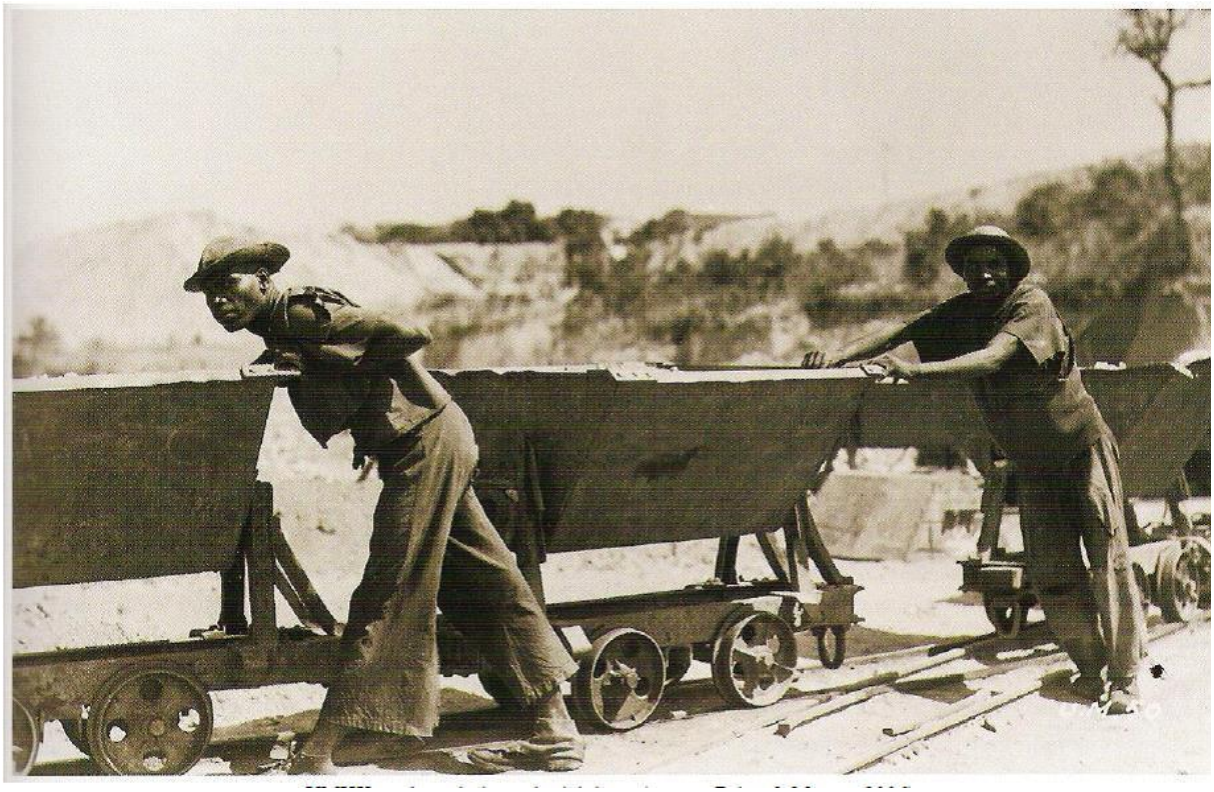


Figure 3.3: Indigenous mine workers in the Katanga copper belt during the colonial period (Velut, 1991)

The third period began around 1920 and was stimulated by the high price of gold and tin on the international market (Banza *et al*., 2009). As a result, about 2500 prospecting rights were granted to research Ponthierville-Nyangwe known as Kolwezi. This period continued through to the1930s and the beginning of the Second World War which led to an increased demand for copper and cobalt (Pourret et al., 2016). Consequently, the Katanga Copper Belt became one of the largest copper producers in the world and the uranium supplier that was used to develop the first atomic bomb (Jan (éd.) *et al*., 2018; Mujinya *et al*., 2013). Also, mining prospecting extended during this period to other regions of the country such as Kivu and Maniema, with the discovery of diamond, gold and tin. It is

during the third period that the first mineral distribution map of the DRC was developed by the Belgium authority. **Figure 3.4** illustrates the first mineral distribution map of the DRC established based on minerals exploration commissioned by the King Leopold the second.

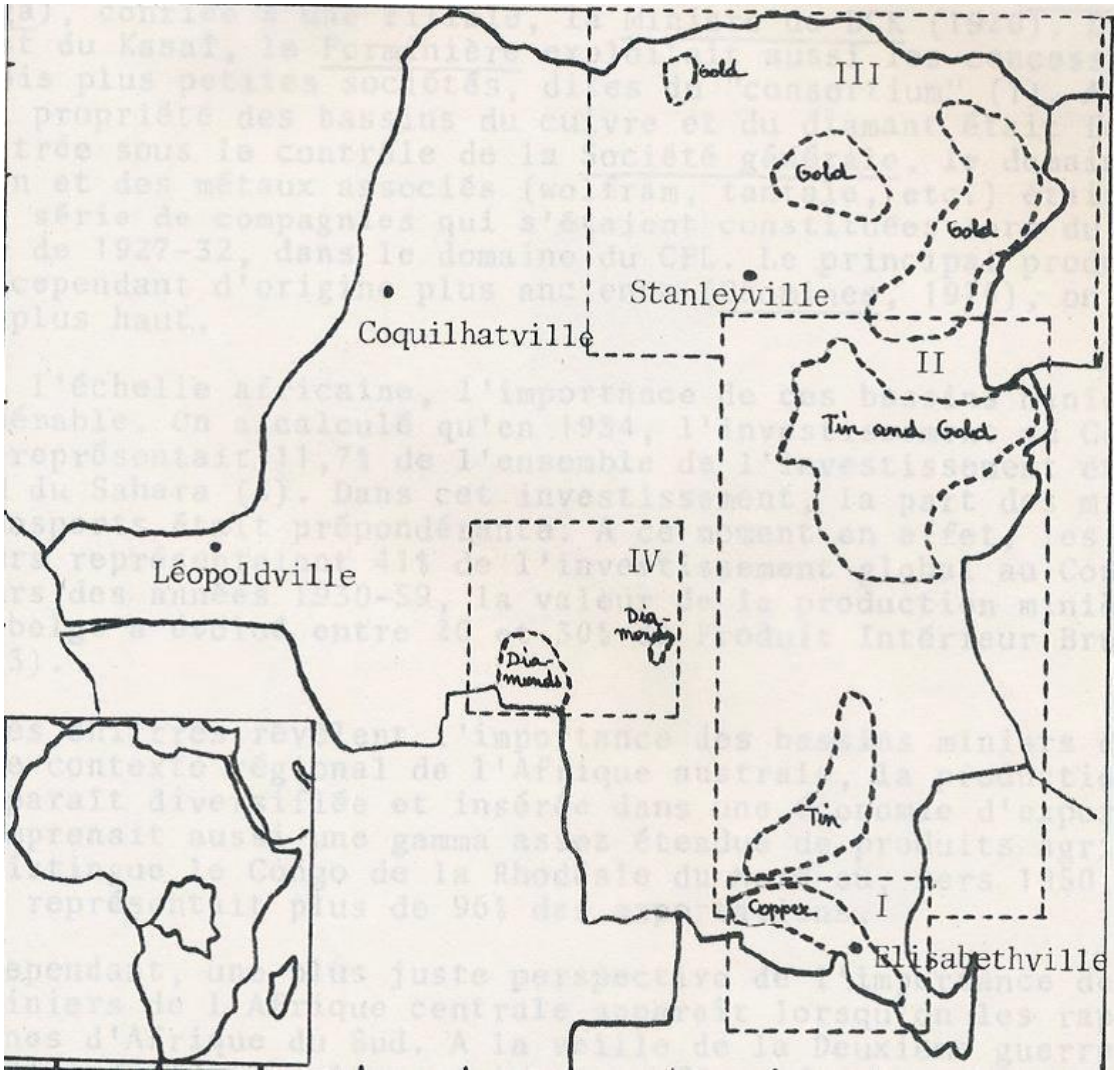


Figure 3.4 Minerals resources distribution of the DRC (Velut, 1991)

A careful examination of the three periods that have shaped mining development in the DRC reveals that the main mining stakeholders, in particular, private entities, remained the largest players in the processing and marketing of copper and cobalt products extracted from the Belgian Congo until the 1960 independence. Private refineries and trading companies also played an important role in supplying the US market, which has strengthened the sovereignty of private companies' vis-à-vis the Belgian government in the mining sector (Vellut, 1981).

According to Mthembu-Salter (2009), private property in the DRC remained the dominant approach to the development of the mining sector during the colonial period.

The private sectors controlled the mining finance projects, policies and politics of industrial development of enterprises while the government or the colonial administration was responsible for the management of the territory and the territorial subdivisions which ensured economic influence (Jan (éd.) *et al*., 2018). The subdivision of economic influence was based on the mobility of African labour forces to establish mining companies (Vellut, 1981). In addition according to Asaro (2012), to the private role in shaping the mining sector in the Congolese colony, the Catholic Church has also played an important role in mining development by mentally preparing African labour forces. The church of the colony depended mainly on financial support and advantages of mining companies. As a result of the economic influence policy on the territorial subdivision, the Katanga region was grouped around the copper mining industry. **Figure 3.5** illustrates the distribution of copper and cobalt mining operations as smelters in the Katanga Copper Belt.

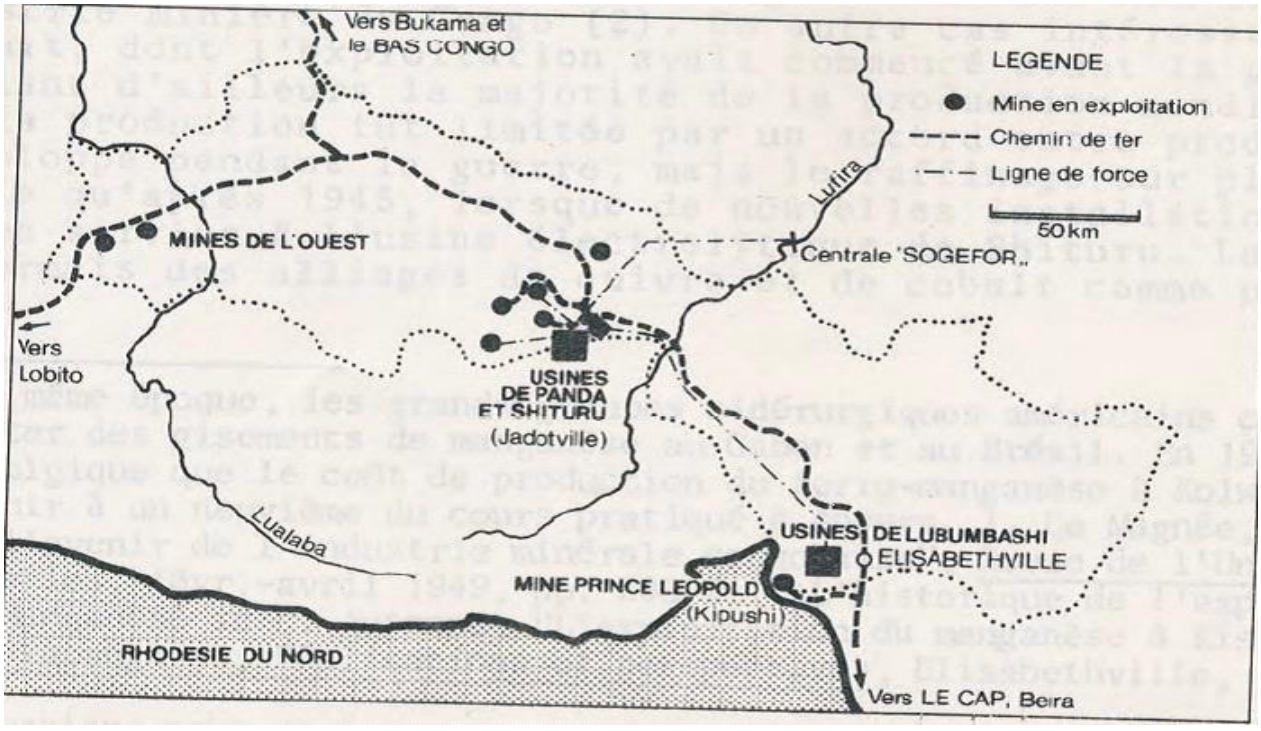


Figure 3.5: Distribution map of copper and cobalt mining operations in the Katanga copper belt (Velut, 1991)

The marketing and sales of the refined copper and cobalt extracted from the Katanga Copper Belt were done through the UMHK. Consequently, the Congolese state and the Katanga Copper Belt, in particular, have not benefited much from mining revenues and the development of the secondary industry. This practice paralysed the socio-economic development and infrastructural development of the province. However, mining development in the Katanga Copper Belt and in the UMHK has played a vital role in the urban development of the study area. Between 1965 and 1988, the mining sector of the Katanga Copper Belt and the UMHK were the main contributors to the GDP of the DRC, with 50% of government revenue and 70% of foreign exchange earnings (Rubbers 2006: 116). The UMHK, for a long time, has been a major job creator and the main employer with copper production estimated at 300,000 tons per year with more than 20,000 workers including 2,000 expatriates.

3.4.1 Development of environmental and mining legislation governing the mining sector of the Katanga Copper Belt

Vellut (1981) pointed out that mining policies were not affected by the various changes in the governance of Belgian policy vis-à-vis the Independent State of the Congo (EIC). The mining sector was still dominated by public-private partnerships. As a result, few considerations have been given to environmental management and the development of environmental legislation. The historical development of the DRC has been influenced by many events that have also had an impact on the development of environmental legislation applicable to mining activities in the Katanga Copper Belt. The study subdivided the development of environmental legislation into three different periods which are, the colonial period from 1908 to 1960, the first republic period from 1960 to 1997 and the third republic period from 1997 –present.

3.4.1.1 The first period: Belgium colony (1908 – 1960)

According to Gondola (2002), the DRC is full of arable land that is combined with a climate and a water system that adapted to support a thriving agricultural sector. In addition to the important mineral reserves of Katanga and the DRC, it also has important fauna and flora that colonial leaders decided to protect from the beginning of their settlement process. In addition, it is the natural wealth that attracted Belgium and King Leopold II to the DRC and its annexation to the Belgian monarchy (Gondola, 2002).

During colonial times, environmental issues were one of the issues that colonial leaders took into account to some extent (Kitambala *et al*., 2003). However, the interest of the rulers in protecting the environment was purely for exploitation purposes rather than for the well-being of local communities who were relegated to slavery status without any environmental rights (Ngondankoy, 2004). It is therefore with this approach that many treaties and royal decrees were ratified and put in place to manage the fauna and flora of the colony. Among the treaties of fauna and flora signed, there were:

(i) The Convention on the Preservation of Fauna and Flora in it Natural State ratified in 1935 (London Convention of 1933);
(ii) The Royal Decree establishing the Institute of National Parks of Congo signed on November 26, 1934.

In this regard, Cornevin (1989) pointed out that some areas are actually protected to avoid the widespread destruction of biodiversity. The colonial charter and key decree signed by the Belgian government to manage the fauna and flora of the DRC are as follows:

(i) Colonial Charter of 1908

It was signed for the exclusive purpose for the administration of the Belgian colonies. It allowed for the DRC to have a legal personality different from that of Belgium (Article 1), and it allowed the Belgian rulers to exercise greater influence over the administration of the DRC by appointing senior officials and signing laws (Gondola, 2002). However, the colonial charter of 1908 does not take into account environmental protection as well as socio-economic development issues.

(ii) The Fundamental law of 1960

It was signed and promulgated by King Baudoin I. It served as a transitional reference law for the independent government until 1964 which allowed the independent Congolese government to draw up its own Constitution (Jan (éd.) et al., 2018; Mthembu-Salter, 2009). Much of the emphasis was on power and administration; however, environmental concerns had not been taken into account yet again (Jan (éd.) et al., 2018).

3.4.1.2 The second period: Independence and Mobutu regime (1964 – 1997)

This period begins with the 1964 Constitution which also known as the Luluaburg Constitution was because it was signed and promulgated in August 1964 in Luluaburg, now called Kasai Oriental. Even if it marks the new beginning and the separation of the previous colonial legislation, it represents a continuation of the general style and the concepts of government inaugurated fundamental laws (Briton 1965 quoted by Ngondankoy, 2004).

The Constitution of 1964 was modified and abbreviated by the Constitution of 1967 which cemented the capturing of power by Mobutu after a coup d'état. Thereafter, he renamed the country to Zaire. According to Muiu and Martin (2009), at the same time, Mobutu was positioning himself as an important ally of the United States against Communists in Central Africa (Mwitwa et al., 2012). However, after the fall of the Berlin Wall and the end of the Cold War, the Mobutu regime ended after losing the support of the United States, France, and other allies. The 1967 Constitution was subsequently amended a number of times until the 5th of July in 1990, without taking into account environmental considerations (Geenen, 2012).

The inclusion of environmental consideration in the Constitution began with the Constitution of the decree of the 28th of May in 1997 supplemented by the 1998 Constitution after the transitional Constitution of 1994 (Perks, 2011). Article 53 of the 1998 Constitution stipulates that "All Congolese have the right to a healthy environment conducive to their development. The State and the citizens have the duty to ensure the protection of the environment". Another innovation of the constitution of 1998 was the introduction of the human development aspect related to a healthy environment (Geenen, 2014). Article 55 states that "All Congolese have the right to enjoy the common heritage of humanity". Following the assassination of President Laurent Kabila and the coming into power of Joseph Kabila in 2001, different rebel groups, opposition parties and the government agreed to sign the transitional Constitution of 2003 with the intention to achieve reconciliation and peace between all parties involved in the Congolese civil war (Mthembu-Salter, 2009).

3.4.1.3 The third period: the AFDL and the first democratic election (1997 - present)

This period begins with the overthrow of the Mobutu regime by the revolutionary movement AFDL led by Laurent Kabila with the help of other countries such as Rwanda, Uganda, Burundi and Angola among many others (Vlassenroot and Raeymaekers, 2004). It was during this period that the country was renamed the Democratic Republic of Congo (Walsh et al., 2018). However, in 1998, some Kabila allies rebelled against him with the support of Rwanda and Uganda, which marked the beginning of a long civil war in the country that culminated in the assassination of Laurent Kabila in 2001 (Mukuna et al., 2018; Vlassenroot and Raeymaekers, 2004). Article 54 of the Transitional Constitution of 1998 stipulated that "All Congolese have the right to a healthy environment favourable to their development. Public authorities and citizens have a duty to ensure the protection of the environment in accordance with the conditions defined by law".

Prior to the first democratic elections in 2006, the country acquired a new constitution that, to a very large extent, incorporated environmental issues and associated them with the right to natural resource-based human development. With regards to mining activities and the protection and management of environmental mining, other articles or clauses support Article 53 of the 2006 Constitution.

With regards to human development and the enjoyment of the country's natural wealth, the country's early regulation makes reference to the Congolese development law, for example:

(i) The 1994 Transitional Constitution provided that "every Zairean has the right to peace, development and the common heritage of humanity";
(ii) The constitutional decree-law of 1997;
(iii) Article 53 of the 2003 Transitional Constitution states that "Every Congolese has the right to enjoy national wealth and the State has the duty to redistribute it equitably and to guarantee the right to development".

Indeed, Article 53 of the 2006 Constitution is the expression of sustainable development as defined by the Brundlandt Commission in 1987. However, this article has not received much administrative and practical support from the government and mining stakeholders to translate the spirit of the legislation into life improvement of the mineral wealth of the Katanga Copper Belt. In order to move forward, Article 58 of the 2006 Constitution

stipulates that “All Congolese have the right to distribute the national wealth equitably and to guarantee the right to development”. In addition, Article 59 states that "All Congolese have the right to enjoy the common heritage of mankind; the State has the duty to facilitate its enjoyment". In addition to the Congolese developmental rights to mineral wealth, the legislation also emphasises the administrative duties of the government to redistribute mining and mineral revenues equitably for the sustainable development of local communities. In addition, Article 123 of the Constitution of 2006 provides for the establishment of regulations concerning the “protection of the environment and tourism”. With respect to the administrative approach, Section 203 provides for “a cooperative governance approach in all spheres of the government to protect the environment, natural sites and landscape, and the conservation of these sites”.

3.5 Decline and recovery of the mining sector of the Katanga Copper Belt

It is well known that the demand for mining products has an impact on the mining industry's ability to survive and grow further. Similarly, declining demand for mineral resources in the international market can lead to declining production and the inability of the mining company to survive during difficult times (Perks, 2011). However, the decline of the copper and cobalt industry in Katanga's Copper Belt began with the nationalisation of foreign-owned mines. This process took place within the framework of the policy of urbanisation, which consisted of nationalising certain companies in order to increase the political and economic independence of the national government vis-à-vis the dominant foreign mining companies of the Congolese mining sector (Nest 2006: 18). In addition, many foreign-owned businesses and farmers have been forcibly taken by the government and in many cases without compensation and redistributed to the local elite. This approach aimed at creating a new middle class among Congolese citizens and the Africanisation of the labour force of mining companies (Cuvellier, 2010). However, with falling commodity prices and the bad reputation caused by the nationalisation of mines in the Katanga Copper Belt, the country's economy was severely affected by reduced mining revenues and the fact that many foreign investors were reluctant to the DRC because of the nationalisation of the mining sector.

Consequently, due to the declining mining sector revenues caused by the nationalisation of mines and falling commodity prices, the central government has not been able to generate enough revenue to cover government expenditures (Callaghy, 1984). The Mobutu

government was forced to engage with international donors as part of the structural adjustment programmes imposed by the Bretton Woods institutions. But the Mobutu regime exercised pressures on public spending which also resulted in increased corruption. Structural adjustments have consisted of reducing state control and encouraging the development of the free market. Therefore, through this process, the weight, inefficiency and corruption of African states hindered development (Chabal & Daloz 1999: 119-123).

It should be noted that the government guarantee for the repayment and finacing of development projects was mainly based on the mining capacities to generate more revenue for the country (Mthembu-Salter, 2009). However, the management of the country and Gécamines at the time neglected to plan for the renewal of infrastructure and production assets of the company. The failure of Gécamines' future production plan was a result of a system known as a puncture. It consists of sending all mining revenues to the central public treasury (Gorus, 2002). Subsequently, Gécamines was unable to cover its debts and was forced to develop different types of financial instruments to prevent its mining assets from being seized by its creditors. This is one of the reasons why the company started cooperating with external traders for the sale of its products. Merchants bought Gécamines finished products but also agreed to pay advances to the company so that it could continue production (André 2003).

The late 1980s saw the development of specialised networks in the theft of cobalt from Gécamines metallurgical plants in Likasi and Kolwezi. These illicit operations were organised by local expatriates, mostly of Greek or Lebanese origin, who mobilised funds through contacts with clients in the international market and powerful businessmen from their own communities. In order to increase their chances of success, expatriates sought the help of a number of Congolese associates who were able to secure the protection of members of political and military networks dominated by the Movement Populaire de la Revolution (MPR). On the one hand, these associates bought the management staff of the metallurgical plant, the industrial guard and a number of army officials. They also trained a team of 50 to 100 people to steal the cobalt inside the factory building (Rubbers 2004: 32-33).

The collapse of the Kamoto underground mine in Kolwezi, which had an economic and political impact on Gécamines' copper and cobalt production, led to a decline in production of around 90% between 1989 and 1993 (Nest, 2006). Following this event, the

governor of Katanga at the time legalised the sales of metal scraps found in Gécamines properties. As a result, organised crimes took place and further contributed to the dismantling of the infrastructure of Gécamines and the Copper Belt region (Mthembu-Salter, 2009).

In the mid-1990s, the government, led by former Prime Minister Kengo Wa Dondo, began with the process of privatisation of the mining sector. The privatisation approach of the mining sector was based on the contribution and financial capital expertise of foreign companies. In return, they acquired part of the management and exploitation rights of Gécamines, including the treatment of mining residues and mineral production (Kennes 2000: 31-312; Verbruggen 2006: 29). During this period, due to declining copper demands in the international market and the deterioration of the country's socio-economic and political situations, most large international companies preferred to stay away, leaving the exploration activities to medium company entities with more experience (Mthembu-Salter, 2009; Mujinya et al., 2011). However, at a later stage, when the demand for copper in the international market improved, the major mining companies began retaking control of junior mining licenses and entering into a partnership with them to mine the mineral deposits together (Kennes 2002: 602). Although the main international mining actors have returned to the country through some form of partnership, the socio-economic-political situation has not improved much. Mining sector functions through less complicated structures and high levels of mobility and versatility allowed mining companies to enter into informal and sometimes illegal agreements with government officials for contracts (Rubbers, 2004: 28).

Contrary to popular belief, there is no evidence that the Alliance of Democratic Forces for the Liberation of Congo (AFDL entered into a single contract with a foreign company while marching to Kinshasa. However, Kabila's party left its mark on the Congolese mining industry by introducing the Exclusive Zones of Research (ZER) system, which had a maximum area of 20,000 km^2. Companies with a ZER permit were allowed to engage in exploration activities in a defined area. Once a company had reached the end of its exploration period, it had the possibility of concluding a contract with the Congolese government, a mining convention that could only come into effect after official confirmation by a presidential decree (Kennes 2000: 312-314).

The decline of formal mining activities by Gécamines created a vacuum that was then filled by artisanal miners who sold their line materials to local and international exporters.

Meanwhile, artisanal mining has become the main source of income for the majority of unemployed local communities. However, institutional stability and investor confidence have led the government to partially regularising the artisanal mining sector to the industrialist, but this time the majority of players are foreign investors (Chinese, Australian, Canadian, etc.).

It should be noted that one of the key aspects that characterised the mining activities of the Katanga Copper Belt since it was industrialised by the colonial power in the absence of sustainable environmental legislation (Mthembu-Salter, 2009). Nevertheless, the contribution of mining activities to the socio-economic development of the region was not negligible, but environmental degradation was great which until today has not been evaluated and quantified in terms of cost (Geenen, 2012).

3.6 Chapter conclusion

The key point of this chapter is that it provides an overview of the study area and, more importantly, a contextual and historical analysis of the mining sector development and practice in the Katanga Copper Belt.

This chapter also highlights the contributions of mining activities on the birth and development of the cities of Lubumbashi and Kolwezi, including the influence of socio-economic activities. The study is about future sustainability, but it currently deals with an unsustainable past related to mining activities, which is a paradox in the context of the study. This has raised a question about how can use something that has been responsible for so much environmental destruction have a sustainable future. Despite long-term mining activities, the Katanga Copper Belt has not benefited from mining revenues and chances are the environment will continue to suffer from unsustainable mining activities.

CHAPTER FOUR

METHODOLOGICAL CONSIDERATIONS

4.1 Introduction

This chapter discusses the methodological approach used in the study. Sobh & Perry (2006) posit that a research method is a technique used to learn about current issues through data collection and interpretation. The first section presents the philosophical positionality of research. The second section develops the research design and highlights the process of identifying and selecting key informants (sampling techniques). The third section is devoted to a detailed discussion of the research design which includes the presentation of the six localities studied, namely the Makomeno, Gécamines compound and Ruashi in Lubumbashi (L' shi); Mutoshi, Dilala and Gécamines compound in Kolwezi (KZI). Section four is dedicated to data collection procedures. Section five discusses the data analysis procedure in detail. To conclude this chapter, the study reflects on the methodological approach regarding lesson learned and challenges encountered during all processes.

4.2 Research Philosophy

According to Neuman (2011), Philosophical positionality or research paradigm plays a vital role in scientific research which can best be described as a system of thinking. Mouton (1996) for his part argues that the paradigm refers to the research tradition established in a particular discipline, or to a philosophical position or framework as argued by Collis and Hussey (2009). Therefore, a paradigm may be considered as a framework or model of observation and understanding that includes accepted theories, models, traditions, approaches, frames of reference, research bodies, and methodology (Creswell, 2007: 19; 2010: 33 & Babbie, 2010: 15, Babbie, 2011: 32). Without a doubt, one cannot neglect the need to define the fundamental beliefs that guide research or study actions in social sciences.

For a study of this nature, different approaches can be employed some of these included pragmatism, postmodernism and positivism. However, for this study, a combination of the interpretive and critical theory was used.

According to Willis (1995), interpretivist believes that there is no single accurate path or a specific method of knowledge. Furthermore, in the interpretive belief, there are no correct or incorrect theories. Instead, the analysis is dependent on the interest of the researcher as well as those involved in the same regions (Walsham, 1993). The primary purpose of the interpretative approach is the understanding of people (Babbie & Mouton, 2008: 28). Research of De Vos *et al.,* (2011: 8) and Neuman (2011: 101) suggest that the interpretive theory goes back to Max Weber (1864-1920) who implies that all humans attempt to make sense of their environment. Dilthey (1833-1911) suggested that there are two different types of science, the human sciences and the natural sciences. Therefore, an understanding of the meaning and significance of the social world is essential (Wilson, 2004: 85). The emphasis and understanding of the social phenomena, informed by participants, the insiders, and endorsed by other participants, discards the broadly applicable laws (Henning *et al.,* 2004: 20-21). Furthermore, Babbie and Mouton (2008: 28), based on Weber's argument, stressed that humans continually strive to understand, describe, produce, justify and rationalise everyday actions.

For this study, the interpretive theory is used because the primary focus is to understand the complex social phenomena of sustainable mining practices for future sustainability using environmental legislation. As well as understanding the relationship between humans and their environment in the context of mining activities. The rationale for this choice is that the research conducted in the interpretative philosophical approach consists of understanding and interpreting everyday events, the experience, social structures, including the values that people are attached to (Collis & Hussey, 2009: 56-57; Rubin & Babbie 2010: 37). This approach has therefore guided the study in approaching different study respondents who are well vested in the management of the mining sector to provide their views on the application of the environmental legislation for the promotion of sustainable mining and sustainable management of the environment.

The study attempts to build a sense of the environmental and socio-economic reality to appreciate the subjective meaning of social actions in the Katanga Copper Belt. It was important for the study to interview critical decision-makers in the mining sector for their interpretation of the social phenomena of poor environmental legislation administration in the mining sector which has resulted in environmental degradation and community poverty. It is essential to consult the documents and legislation in order to interpret how the

concept of sustainable development was captured and how it affects the decision-making process of mining stakeholders. Wisker (2008); Blumberg *et al.*, (2011) pointed out three basic principles of interpretation which are: (i) the social world is built and given a subjective meaning by people. It means that the human being as a subject possessed a consciousness or spirit, whereas human behaviour is influenced by the knowledge of the social world which exists only concerning the social world; (ii) The researcher becomes an integral part of what is observed, and (iii) The research or study is motivated by interest.

The study was consistent with the above principles. Phenomena observed today can change tomorrow and produce results that go beyond scientific understandings (Rubin & Babbie, 2010 and Blumberg *et al.*, 2011). Therefore, in this study, the researcher tries to understand the subjective realities in order to provide a meaningful explanation and interpretation. However, the social world can be understood differently by different people in different circumstances and places. Blumberg et al. (2011) believe that human interest has an impact on the way the world is studied and how knowledge is constructed. Therefore, the analysis of the social phenomena on which the study is based should also reflect the conventional construction of existing knowledge. As a result, the study also collected measurable facts to explore why the DRC has not been able to use environmental legislation to promote a sustainable mining practice for future sustainability. The importance of this approach was to understand how this will translate into different constructs and meanings that people give to the social world. Henning *et al.*, (2004) emphasised that perception is rooted in an interactive and inductive methodology that is closely linked in practice to a specific context. Therefore, the best methods suggested in the interpretive research are those based on observation and interpretation (Livesey, 2011). Similarly, De Vos *et al.*, (2011) proposed the use of participant observation and field research techniques in which the researcher spends many hours and many days in direct contact with participants. During fieldwork, the author spent more time taking personal notes and observing different phenomenon unfold.

Critical theory is defined as a theory aimed at criticising and changing society in opposition to the traditional theory approach which focuses solely on understanding or explanation of society (Horkheimer, 1937). It is a form of historical, structural and value-based exposure or the liberation of social phenomena (Babbie & Mouton, 2008: 36). Furthermore, the reason is the highest potential of the human being. Therefore, it is possible

to criticise the status quo of society through reasoning (Blaikie, 2007: 135). Nevertheless, the researcher must strive to remain objective as much as possible and conscientiously undertake the study in order to avoid that reasons of bias affect the results. According to Blaikie (2007: 135), "the critical approach is based on human reasoning which is the greatest potential for the human being that is used to criticise the nature of existing societies". Hence, it places a strong emphasis on the historical and social context in order to make sense of social events (Lincoln *et al.,* 2011: 99). Marxism has influenced critical theory; it thus provides a philosophical and methodological approach to research and evaluation as useful and unambiguous forms of engagement and policy (Cohen et al., 2007: 26-27; De Vos *et al.,* 2011b: 9).

Jurgen Habermas work has also affected the critical theory but was also the first to clarify the transformative and emancipatory reasons for critical theory (Babbie and Mouton, 2008: 34). Patton (2002: 130-131) stressed that the most influential orientation framework is critical theory. Not only is the focus on understanding society, but also on criticism. The critical theory becomes obsessed with the process of growth, maintenance and circulation of existing powers of dynamics. Also, critical theories consider the local community as a specific phase of a long and continuous process (Henning *et al.,* 2004: 23; Lincoln *et al.,* 2011: 98, 100; Newman, 2011: 109). In many cases, proponents of critical theory consider that facts are influenced continuously and influenced by social, political, and cultural factors. Nevertheless, critical theory specialists such as Skinner and Edward (2005: 404-405) prefer support action research, but not all forms. Newman (2006: 101, 2011: 114) notes that, for proponents of the critical theory approach, all research should begin with specific points of view and denying that a researcher has a point of view is in itself a point of view.

The critical theory was used in the data collection process by encouraging study participants and making them comfortable to express their own opinions based on their own experiences of the environment in which they lived or work. The reason for this is that respondents are part of the day-to-day experience of mining activities. Moreover, bearing in mind that human reasoning can influence the results of the study, as a researcher, the author tried to remain objective by avoiding any personal feelings.

The critical theory seeks to change society through constructive criticism. As part of the study, a study to understand the phenomena of environmental degradation and adverse

socio-economic conditions of the Copper Belt of Katanga regardless of the growth of mining activities and environmental legislation was conducted. The study uses the critical approach to understand the current situation and phenomena in order to propose a solution that will bring about sustainable change in mining practices and in the well-being of local communities. Qualitative and quantitative data was generated through empirical studies (interviews and surveys) with the objectives of creating a society and a community where all the mining stakeholders will respect the rules of the environmental laws but also be free to express concerns which will contribute to advancements of the society.

In conclusion, the critical theoretical approach played an essential role in the data collection, analysis and reduction of subjectivity. This study uses empirical data from the analysis of documents and a questionnaire, but also individuals were used in order to generate non-empirical data. Thus, both interpretation and critical theory are present.

4.3 Research design

The focus of this section is to outline the different methods used to collect data/ in relation to the aims and objectives of the study. The section begins by providing an overview of the target population and sampling procedures used to gather study participants.

The data collection tools are presented and discussed in order to provide an insight into the manner in which information was obtained or collected, what was collected, and the difficulties encountered in the process of data collection.

4.3.1 Description of the research sites

All the sites studied were selected based on the role that mining activities played in their creation, development and proximity to some mining operations as well as their historical place in the development of the Katanga Copper Belt. In addition, the selection of these places was made in order to obtain the objectives par excellence of the study. Thus, the process began by explaining to the various participants the objectives of the study.

4.3.1.1 Quartier Mampala, quartier Makomeno and Rwashi (Lubumbashi)

Makomeno is part of the city centre of Lubumbashi where most of the middle and some upper- class people live. This area was developed for European families and some middle-class Africans hired by the Gécamines (CGM). Due to the economic crisis that had affected

GCM in the 1990s, its population increased following the practice of renting the cottages and selling parts of the plot. Its current population is estimated at 6246 people (2016). Quartier Mampala is one of the subdivisions of Gécamines compound in the city of Lubumbashi. It is an agglomeration made of social housing built by the GCM for low-income earners. It is located to the south of the GCM smelter of Lubumbashi and other social facilities such as hospitals, schools and recreational centres. It is also located about 4 km from the city centre of Lubumbashi. Since the beginning of the 2000s, this city has seen an increase in the number of its inhabitants increase following a demand for housing located on the outskirts of the city centre. Rwashi is a local municipality located to the north-east of the city of Lubumbashi. It was created in 1956 to respond to the increase in urbanisation in the city. The primary objective was to house the low-income population which was working for the State. It is famously known for its cultural activities which include the making of art objects. It includes the neighbourhoods of Bendera, Kalukuluku, Matoleo, Shindaika, Kawama, Kongo and Lwano.

The figure below **4.1** designates the location of the city of Lubumbashi and in particular the 3 main locations (Rwashi, Gecamine and Makomeno) where the study was conducted. It should be noted that all three places are in the vicinity of the mining facilities such as quarries and smelters established and operating in and around the city of Lubumbashi including Rwashi mining, the STL, Gecamine and Shemaf.

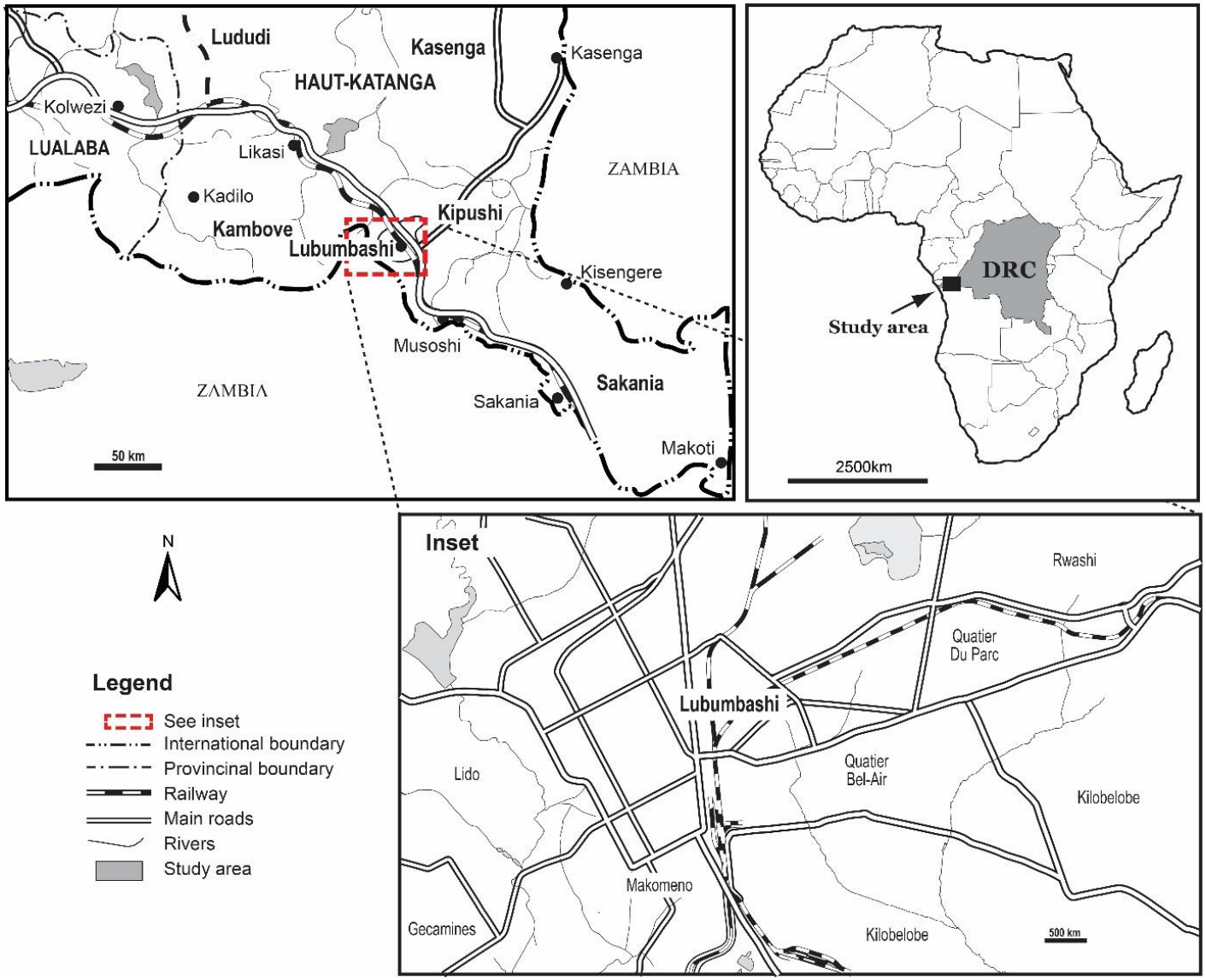


Figure 4.1: illustrates the location of the study site within the city of Lubumbashi that is (Rwashi, Gecamine & Makomeno).

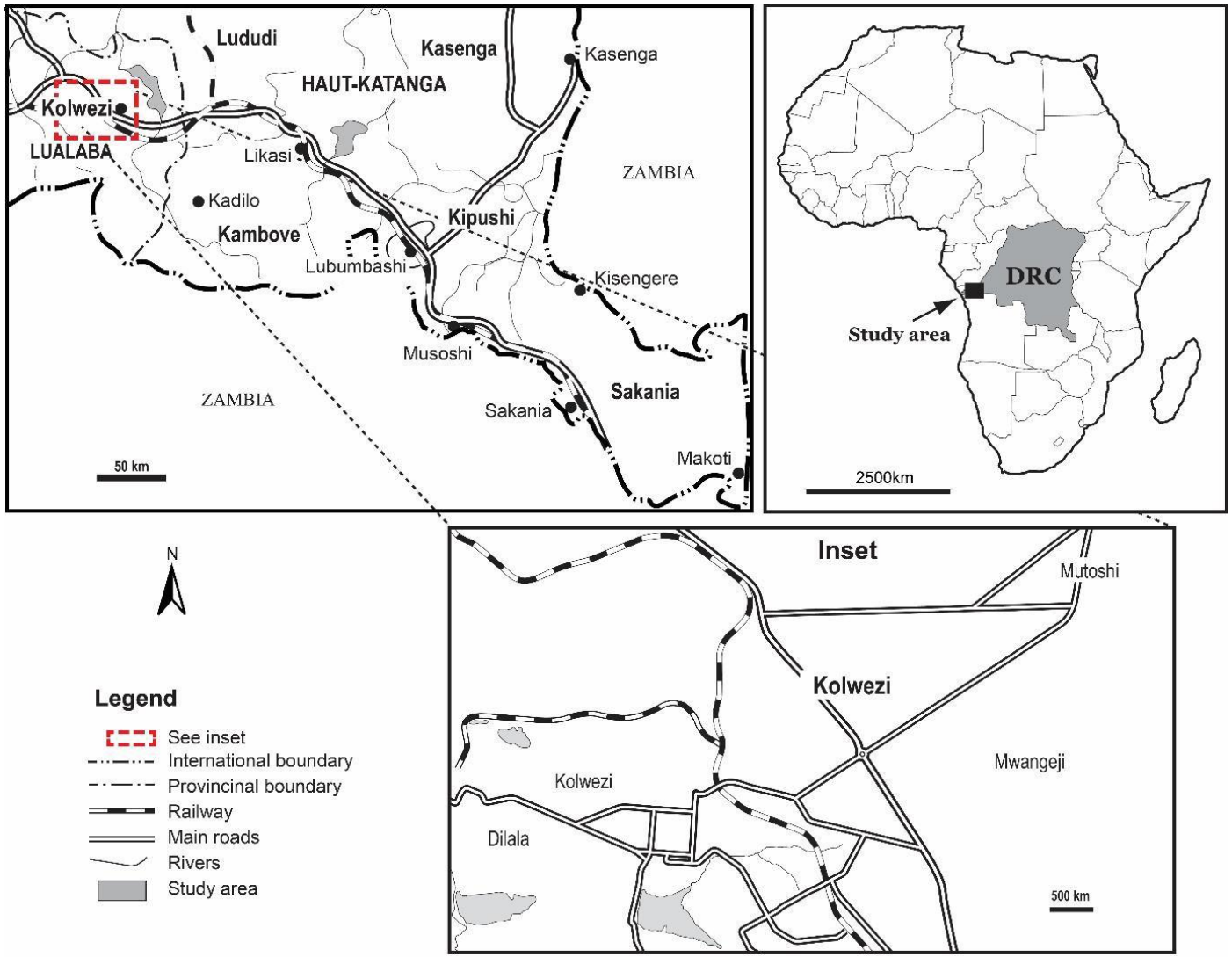
Source: Cartography Unit (2018), School of Geography and Environmental Studies, University of Witwatersrand, South Africa, and field survey (2018).

4.3.1.2 Gécamine compound, Dilala Local municipality, Mutoshi (Kolwezi)

The Kolwezi Gécamine compound is located to the south of the city of Kolwezi; it was developed in close proximity to the Kolwezi city business district. It is made of social development houses exclusively built for the housing need of the low-income labour force of Gécamine. Since the beginning of the year 2000, the population of Gécamine compound increased due to its geographical location of the new mining companies and the old Gécamine smelter plant. Gécamine compound also offers quality social infrastructure and amenities such as hospitals, schools and recreation centres.

Dilala local municipality is one of the three local municipalities that made the city of Kolwezi. It is located to the east of the city. It was developed for the urbanisation needs of the growing mining and public low-income earners. However, due to a growing artisanal mining industry, which has attracted many communities from the neighbouring province, a new social class has emerged slightly above the initial population of low-income earners. It is also important to note that, since 2000, Dilala has grown to become an important commercial hub of the city of Kolwezi which is characterised by general trade. Mutoshi is located 8 km north of the city of Kolwezi. It was initially developed for the housing need of the European middle and upper working class in the mining sector and public administration. However, with the advent of the Mobutu regime followed by Zarianization and the 80-day war, many Europeans left the city of Kolwezi and gave way to the African middle-income workforce and military officers to occupy the vacant homes. Since 2011, Mutoshi has seen a growth in guest houses and the hotel market.

The figure below **4.2** designates the location of the city of Kolwezi and in particular the 3 main locations (Mutoshi, Gecamine and Dilala) in the Lwalaba province which constitute the second province and city where the study was conducted. It should be noted that all three places are in the vicinity of the mining operation such as quarries and smelters established and operating in and around the city of Kolwezi including Kamoto Copper Company (KCC), SMK and Gecamine.



Source: Cartography Unit (2018), School of Geography and Environmental Studies,

Figure 4.2: Geographical location of the city of Kolwezi and study sites (Dilala, Gecamines compound and Mutoshi)

Source: Cartography Unit (2018), School of Geography and Environmental Studies

4.3.2 Target population and sampling methods

Environmental legislation and document applicable to the mining sector in the Katanga Copper Belt were used as the primary basis for the empirical discussion in this study. This data was relevant in assessing how the legislators introduced and captured the principle of sustainable development, but also helps to assert the issue of sustainable mining practices and sustainable development of local communities. Besides policies and documents, the primary data were collected in six different study sites from the local communities. In addition, the study conducted interviews with professionals who are well vested in the management of the mining sector. The purpose of using survey interviews was to measure the socio-economic and environmental impacts of mining activities in the study areas. Furthermore, survey interviews helped to reflect on the general attitude towards mining activities versus EL and sustainable development.

The primary data was collected in six local communities of the Katanga Copper Belt: Lubumbashi (Makomeno, Quartier Mampala and Rwashi) and Kolwezi (Dilala, Mutoshi and Gécamine compound). In all six local communities, the selection of individual's households includes a population list which was created using a probability random sampling technique interval of systematic sampling as well as stratified random sampling. It is also important to note that the interval sampling technique was used to select household participants in all six study areas. The primary purpose of using sampling methods was to give an equal opportunity to all households in the study area. Secondly, it was important for the study to ensure that accurate results were obtained before making any generalisations and inferences.

4.3.2.1 Lubumbashi and Kolwezi

The study was conducted within two main cities of the Copper Belt (Lubumbashi and Kolwezi). Within the two cities, the study was further scaled down to focus on three different settlements in each city: Makomeno, quartier Mampala and Ruashi local municipality in Lubumbashi. Dilala local municipality, quartier Mutoshi and Kolwezi Gécamine compound.

The sampling process began in Lubumbashi with Gécamine compound which is subdivided

into four different sections, Quartier Mampala, Quartier Bruxelles, Mumbunda and Kabolela. In the Gécamine compound, the study focused only on Quartier Mampala which has **160** households. Furthermore, the study focused on the Rwashi local municipality which is subdivided into eight different quarters. In Rwashi, the study focuses on the sixth quarter known as Quartier Kongo which has **240** households. The last settlement which the study focused on is Makomeno which has **220** household**s**.

Like in the city of Lubumbashi, the same process was repeated in the city of Kolwezi. The process began in the Gécamine Kolwezi compound which is subdivided into 6 different quarters. The study focused on the fourth quarter, which has **280** households. The second settlement is called Quartier Mutoshi and it is subdivided into six sections and the study focused only on the fifth section which is made up of **160** households. The last settlement is the Dilala local municipality which is made up of eight different quarters; the study focuses on the third quarter which is made up of **170** households.

In order for the study to be more objective in the selection of households to be included, the selection process was done through rough selection methods in order to pick one quarter in each settlement that has more than one quartier. The rough selection process consisted of putting in the same basket, a number of jetton with the names of all quartiers written on it. Then the basket was jolted and one jetton was picked. After this process the study needed to scale down to the specific households, thus the author decided to apply a margin error of 5% to the total household. Hence, **5%** of the total household gave 242 households which constitute the sample size. In order to select the households, an equation was employed to determine the interval ratio for the selection of household.

$$\boldsymbol{K = \frac{N}{n} = \left\{\frac{size\ of household}{size of sample}\right\}}\ \textbf{Thus K} = \frac{\mathbf{1210}}{\mathbf{242}} = \mathbf{5}$$

Where K is the interval ratio **K**= 5

Source: Kubanza and Simatele, 2015

Based on the above equations and results yielded from the calculation, it was decided to include every **5th** house of every street included in the final study sample. The selection of households was based on plot numbers, and speaking mainly to the head of the family and or elderly person from the age of 20. This sequence of selecting households and participants

in the study was applied to the entire study area. The whole process involved the variability of sampling representation in order to validate the main theoretical argument proposed in the study.

In total 185 households were surveyed from the two central study areas. Interview questionnaires with local communities depended on the willingness and understanding of the mining sector and environmental legislation and the sustainable development concept. The interviews lasted about 25 minutes. **Table 4.1** provides an overview of the local community which were surveyed in the Katanga Copper Belt and the periods.

Table 4.1: Respondents distribution per location

PROVINCE	**CITY**	**STUDY SITES**	**Period**	**Total**
Haut-Katanga	Lubumbashi	Quartier Mampala: 30 Makomeno: 43 Ruashi: 45	August 2015 September 2015 October 2015	118
Lualaba	Kolwezi	Gécamines compound: 42 Mutoshi: 27 Dilala: 33	February 2016 March 2016 April 2016	102

Fieldwork material

Following the household interviews, the results were grouped into different categories for better cross tabulation. The following groups were identified: Gender and age distribution, educational level, the source of income, a source providing environmental educations and length of stay.

4.3.2.2 Professionals

In order to identify the role of environment legislation in mining as well as factors affecting the environmental legislation administration for the promotion of sustainable mining practice in the Katanga Copper Belt and weakness of the environmental legislation itself, it was essential for the study to include professionals of the mining sector who are directly involved in the application of the environmental legislation. According to Armah (2011), due to the fact that mining activities affect a different aspect of the communities, the study includes professionals from mining companies, government institutions including NGO representatives involved in the promotion of the socio-economic and environmental right of local communities in mining areas. The selection procedure for professionals

participating in the study was done following the non-probability snowball technique. According to Bailey (1994: 439), a snowball sampling method is "a nonprobability form of sampling in which persons were initially chosen for the sample are used as informants to locate other persons having necessary characteristics making them eligible for the sample". Furthermore, snowball sampling technique is a sampling method that consists of "identifying an initial number of subgroup members from whom the desired data are gathered and who then serve as 'seeds', or study staff recruited respondents, to help identify other subgroup members (i.e. individuals who engage in the same types of behaviours) to be included in the sample". These individuals, in turn, are asked to provide information on other subgroup members, and the process continues until either a target sample size has been reached or the sample has become saturated (Penrod, Preston, Cain & Starks, 2003: 102). Furthermore, according to Dias (2012), the use of the snowball sampling technique was crucial at this stage of the study due to the fact that, the study had identified the government institutions, mining companies and NGO's to be included in the study which had no control over the specific professionals to be included in the sample study due to protocols that needed to be followed within each institution.

Thus, the selection of key informants was based on their ability to provide the study relevant data about environmental legislation administration and provide their views on solutions on how to uphold environmental legislation in the mining sector of the Katanga Copper Belt as well as which area of the legislation formulation could be formulated. Furthermore, the quality and role of each institution play an important role in their inclusion in the study based on their role in the mining sector especially in the administration of environmental legislation in mining activities. Hence, based on the snowball technique, professionals from the following government institutions, mining companies and NGOs were included in the study, Cadastral Mining, Mining Division, the Department of Environmental Affairs, Police of Mines, Department of Justice, six mining companies and three NGOs. **Table 4** provides the details and number of study respondents in the government institutions, mining companies and NGOs.

Table 4.2: Official's participants in the study

Mining Stakeholders	Number	Period
A. Experts		
1. Mining companies	6	August 2015
Foreign companies	5	August 2015
National local companies	1	September 2015
2. Government institutions	6	August 2015
Cadastral mining, Department of Mining; Department of Environmental Affairs	3	September 2015
Specialised government institutions	3	October 2015
Police of mines, Department of Justice	3	November
B. Non-expert		
3. Non-government organisation	3	October 2015
Local NGO's promoting environmental rights	2	October 2015
Local NGO's promoting human right s	1	October
4. Community leaders	2	February 2016
5. Lawyers	3	February 2016
Prosecutor	1	March 2016
Advocate	1	March 2016
Mining labour association	1	March – April 2016
TOTAL NUMBER OF INTERVIEWS	**26**	
TOTAL HOURS OF INTERVIEWS		
TOTAL NUMBER OF MONTHS	**4**	

Fieldwork material (2016)

It is important to note that, although other sampling techniques could be used for the study, the use of the snowball sampling technique for the selection of professionals proved to be appropriate for studying the role of environmental legislation in the Katanga Copper Belt for the promotion of sustainable mining.

4.4 Data collection tools

The study used different research methods, and the importance of using different methods is to triangulate the government institution's approach to environmental governance in the mining sector concerning environmental legislation, the mining company's representation views and suggestion on the current approach to sustainable mining practice. It was also essential to get local community views on the impacts of mining activities in their environment. Some of the tools which the study used to gather empirical evidence are interviews, survey questionnaires, participatory observations, and policy and document reviews.

4.4.1 Policy and document

Document and policy such as publications by the ministry of mine, the ministry of environmental affairs and sustainable development, the city of Lubumbashi and the city of Kolwezi were collected. In addition, environmental and mining policies were collected using the internet and visiting each provincial department involves in the management of environmental mines and cadastral mining. The source of information was a very detriment to the study as it allows the thesis to establish the capturing of sustainable development principles by different policies as well as the legislative mandate of government to monitor the application or non-application of the environmental legislation in the mining sector.

Therefore, it should be noted that much of the legislation used in this study were accessed through an active web search. Some government department such as the mining and environmental department host a webpage that provides links to relevant documents and policies related to environmental management of mining activities. Each of the relevant legislation was downloaded and analysed later.

Even though some legislation and document were obtained from internet download before travelling to the Katanga copper belt, however, many documents were not accessible through internet due to the fact that most government institutions do not have a website and the e-government set up in the country still at their very infant's stage. Therefore, in order to obtain additional and updated information, I used the University of Lubumbashi and Kolwezi libraries as well as libraries from the court of appeal of Lubumbashi, cadastral mining and environmental department.

About 150 documents were collected; this includes mining companies' reports on sustainability practice, government department report, non-government organisations report and publications, legislative document/acts, video materials produced by a local and international organisation on environmental protection against mining activities on local community human right.

Subsequent to policy download and/or collection, the study embarked in an extensive legislation and policy analysis for evidence of sustainable development principles capturing. The study engaged with the appraisal of existing policies in order to informed interviews structures.

In the identification of different policies, an initial process which was embarked on was to understand the mandate of different government institutions and legal framework. These were identified based on what their mandates are and the manual identification involved identification of government institution mandate and delivery framework. The criteria for the selection was to understand whether they are involved in land transformation, natural resource management, water resource management, environmental management, fauna and flora management and social economic development. Based on these criteria we zoomed down to understand which institution and legislation have a direct link to with the mining industry and their activities. Hence, after establishing the mandate and functions of government institutions it was important to understand what legal framework gives them a mandate to carry out their functions and different component was identified. Hence, the identification of legal framework help framed the interview with key respondents involved in the implementation of the environmental legislation in the mining sector.

4.4.2 Interviews

Interviews are mainly used in qualitative studies because they allow the researcher to "learn social life through the perspective, experience and language of those who live it" (Boeije, 2010: 62). The study relied heavily on in-depth interviews **(see Appendices B and C)** with selected mining companies, representatives of government institutions, representatives of NGOs, and managers.

Interviews include closed questions and open-ended questions to allow respondents to express their thoughts and views freely. An open interview was used because it provides

flexibility and active engagement between the interviewer and the interviewee (Fontana and Trey, 2005). The level of flexibility of the methods used proved to be beneficial (May 2001) because it allows the study to "explore incomplete articulated aspects of the experiments, encouraging respondents to develop topics related to their own experience" (Holsteix & Gubrium, 2004). A semi-standardised subject format was used to obtain information on issues related to sustainable mining practices, application and administration of environmental legislation and local community development. This approach ensures that each key informant provides information to the key questions of the study. Moreover, it helps the study "to have more latitude to explore beyond the answers and thus enter into dialogue with the interviewees" (May 2001: 123).

In order to carry out qualitative interviews, the principal respondents of the study were selected in study areas (Lubumbashi and Kolwezi) by reasoned sampling because they are non-probabilistic elements (Cooper & Schindler, 2001). Thus, before departure to the Katanga Copper Belt, the researcher compiled a list of critical informants identified in government institutions, mining companies and NGOs. Also, the need for reasoned sampling for this study is found in the selection of informants who manifest the phenomena of interest to better understand the theoretical concept outlined in the proposed study (Patton, 1990).

Due to the nature and sensitivity of the information required for this study, the response of high-ranking vital informants was found to be reliable in order to standardise information in the mining sector (Mitchell, 1994). Therefore, the selection of professionals was based on their position in the organisation or community. Thus, the interview questionnaires were designed to suit those who are familiar with the issue being investigated (**see Annex 3**). The official's respondents were selected from an environmental and sustainability division, lawyers, government divisions involved in the management of the mining sector and NGOs.

A snowballing technique was applied to deliberately identify and select mining stakeholders, governmental and non-governmental institutions. As a result of this approach, a combined number of 20 interviews were conducted with professionals from representatives of mining companies, government officials, NGOs, the police force of the mining services, the cadastral mines, the lawyers, and the magistrate of Katanga Lubumbashi, Kolwezi University, and the Federation of Congolese Enterprises (FEC).

Interviews with professionals were mostly conducted at their place of work. Based on the snowball sampling methods, after an interview, the interviewee was asked to refer to their colleagues or friends who are well invested in the environmental management of the mining activities. This approach also helps the study in that the majority of respondents were willing to provide contact and information on behalf of the researcher to interview them. In many cases, this approach has led to many successful interviews.

Interviews with crucial informant were in the form of semi-structured interviews and efforts were made by the interviewer to elicit information without leading the interviewee. This approach was adopted with the aim to let the interviewee tell a story and provide their impression. Hence, attentiveness and interactive were essential in order to gain a more in-depth understanding of the respondent's views and perspective. Boeije (2010:63) states that "during interviews, it is paramount that the interviewer to some degree accommodates the participant's need to spend more time on certain issues, listen with interests and does not interrupt the flow". The length of the interview ranged from 40 minutes to 60 minutes and was guided by a set of questionnaires. Most questions were common to all officials 'respondents for consistency. However, some questions had been adapted to the context, position and field of the respondent (mining, judicial, police, cadastral, environmental).

4.4.3 Survey questionnaires

A targeted interview was used for respondents from the local community, specifically, heads of households and street vendors. Its open nature allows flexibility and the discovery of meaning and "qualitative depth by allowing interviewees to talk about the subject in their frame of reference to better understand the point of view of the subject" (May 2001: 124-125). In addition, according to Anaebo et al., (2015) and evangelicals (2006), targeted interviews with members of the local community allow the study to establish the socio-economic impacts of mining activities and how the government seeks to promote the sustainable development of the local communities and the community's right to a clean environment. Also, it provides comprehensive views of local communities regarding mining practices concerning the country's environmental legislation.

Before the departure for the Katanga Copper Belt, local community questionnaires had to be translated from English to French, which is the local official language. Copies of both

versions of the questionnaires were submitted to the Human Ethics Committee of the University of the Witwatersrand for approval. Upon arrival in the city of Lubumbashi and before the administration of the questionnaire, ten copies of the questionnaires were tested in Lubumbashi in order to refine the questions covered by the research instrument. It was anticipated that the pilot test would be useful for assessing the strength and validity of the questions and their reliability for data collection.

Pilot test respondents were invited to provide feedback on the strengths and weaknesses of the questionnaire, the clarity of the instrument, the time it took to complete the questionnaire, and the areas of the questionnaire that were omitted. Some adjustments were made to the questionnaire based on feedback received from respondents who participated in the pilot session. The questionnaires took the form of a personal interview in which the interviewer asked the questions and recorded the answers received from the respondents. The questionnaires were structured to allow the study to gather factual information on the social and economic status of the households, including their environmental impacts of mining in their regions. The selection criteria for the local community were the length of stay (10 years and over) and age (20 years and over). The respondents' age from 20 were included because they have a certain level of understanding of the environment and they are contemporarily engaged continuously engaging with contemporary information and has quite an understanding through media and ABC. They understand what their right is comparing to the old generations. Hence, this group of respondents were very important in terms of highlighting whether they understand what their right is and environmental legislation in place which can be used to manage the environment and promote community development. In view of this, their views, however, were basically in terms of do they understand and compare with how they influence people around them and the environment. However, in terms of understanding changes that have occurred as results of mining activities, older populations were called upon starting from the age of 30 going upward.

The survey was administered with the help of three field assistants who were selected from the University of Lubumbashi and trained before starting work. Structured and planned interviews in the form of questionnaires helped the study to obtain household responses with limited school education. Alongside personal interviews with the local community, the study avoids the pitfall of mailed questionnaires and telephone interviews, which are some of the other types of data collection instruments with survey methods. A total of 220

households were surveyed from two main study areas, each subdivided into three different study sites.

4.4.4 Participatory observation

Bryman (2012: 432) prefers to use the term ethnography instead of participant observation and postulates that it is a method of social research and a finished product of ethnographic research. Ethnography consists of observation. According to Bernard (2006: 342), participant observation is "... a humanistic method and scientific methods". It is a profession or art that goes through practice-based rigorous controls relating to the collection of evidence. These methods are the best compliments for the interviews, as the researcher often uses both interviews and observation methods to gather more information (May 2001: 159).

Participatory observation helps the study to take into account "body language and other gestural signals that make sense of the words of interviewees and to learn things that people would not want to talk about" (Patton, 2002: 263). Participatory observation helps the study understand the dynamic relationships between the local community, mining companies and government institutions. The advantage of using this technique, in this case, is that the presence of the researcher in the local community helps to better understand the interventions of the government and mining companies in the Katanga Copper Belt. Also, the flexibility of these techniques helps the researcher to make favourable adjustments along the way.

The approach to use direct observation was facilitated by being immersed in the community and gain trust by developing relationships with people so that they can feel free to express their views. A notebook was kept to note each experience. The second observation approach used was indirect observation, which consisted of observing the development of the phenomena related to mining activities, such as survival strategies during retrenchment, mine closure, and environmental degradation.

Using this method, the researcher managed to integrate the communities of Kolwezi and Lubumbashi. Because of a mining protocol, the author did not have access to certain mining facilities, and I was not allowed to take pictures inside mining concessions. This led the researcher to be a participant observer, which meant that interactions with mining

workers were limited to the local community's place of life but not to their workplace. The author took notes during fieldwork in Ruashi, Dilala, Gécamines and Mutoshi. These notes become a vital source for a train of thought, thus making it easier to remember evidence that was not captured through interviews. During this process, the author took numerous photographs to illustrate the type of socio-economic activities in the mining areas and the impact on the natural environment.

4.5 Data analysis

The study argues that the use of theories in data collection is an important aspect to achieve the study's objectives and support the argument with a more credible justification. This is the link between the theoretical statement and the data collected. Incidentally, the study sought to make the best use of this standard in collecting qualitative data in order to test the theoretical arguments of the study and to provide analysis that follows constant comparison methods (Glaser and Strauss, 1997). Even though each respondent was treated as a single unit, data analysis was conducted using a thematic approach. According to Boyatzis (1998) thematic content analysis is a method used to identify themes that emerge in data from multiple sources and themes composed of a thematic code. Also, the thematic content analysis is a versatile methodology in that it can be used by any researcher, regardless of the epistemology or ontology of research (Boyatzi, 1998, Burnard, 1991). Thematic content is appropriate for open data, such as key informant interviews and community questionnaires, and allows for such analysis (Harwood and Garry, 2003).

Furthermore, the thematic content analysis is a versatile approach because it can be used in both inductive and deductive studies in nature (Boyatzis, 1998). The thematic content analysis was used to support the claims made with the data that had been obtained and therefore as a methodology, and this ensures that the claims made can be sustained (Guesst *et al.,* 2012). It is rigorous to ensure that supporting statements link the thematic content analysis to the anchored theories (Guesst *et al.,* 2012).

Inductive or explorative thematic content analysis is a process in which new understandings or theories are developed. Guesst *et al.,* (2012) suggest that new understandings or theories are based on data that has typically been acquired from reasoned sampling methods. "The purpose of the research is less to test the already known (e.g. theories already formulated in advance) than to discover the news and develop

empirically grounded theories" (Flick, 1998:5). Thus, the study used inductive content analysis in order to develop themes derived from empirical data. The collection of these themes is known as a thematic code.

On the other hand, deductive thematic content analysis or confirmation is the process of testing a theory or code that has already been developed (Guest *et al.,* 2012). The study's analysis process began with the translation of interviews and questionnaires that were conducted in French into English, and then grouped the document according to the content and codes were given to each dataset. As a result, data analysis started with legislation and document content analysis using the three pillars of sustainable development as defined by the Brundtland Commission. Following the deductive approach, the legislation and the documents were grouped according to the protection and prevention of adverse impacts of mining activities, including the promotion of the right of local communities to a clean environment and access to natural resources. Selected themes were identified, analysed and spread across the data collected (Yin, 2014).

Analysis of data collected during the fieldwork explored models of socio-economic similarities to local communities in mining areas, including the impact of mining activities on the natural environment. Also, the analysis examined different models of EL administration in the mining sector. This approach has been helpful in this regard, as it helps construct arguments to compare connections between theories and data, thus seeking detailed information in a qualitative approach.

4.6 Methodological reflections

Any field research, regardless of the research methods used, faces challenges, obstacles and gaps due to the nature of the study, the study area and the respondents involved. In this regard, Yin (1994) alludes to the fact that it is normal for researchers to have difficulty with the data collection process. Methodological deficiencies in the social sciences and human geography in countries of the south can be attributed to cause-and-effect relationships such as the identity of the researcher, the political and socio-economic context, culture, accessibility to information and the study area. In this section, the study provides some challenges encountered during the fieldwork on the methodology and how these challenges were overcome.

4.6.1 Official participants

The nature of this research required the involvement of public institutions and officials, as they play an essential role in the application of EL in mining activities. One of the most pressing challenges faced during the fieldwork was, to involve government officials and mine officials. The officials' reluctance to participate in the interview sessions can be attributed to the fact that many view the subject as sensitive and fear being exposed or reprimanded. Some officials, considered the study as a survey to expose them to the media or local authorities. Thus on some occasions, it was required to submit the questionnaires to the legal department before being given the opportunity to conduct the interview. Also, junior mining companies provide access to their mill. The rejection from the government institutions came in the form of excuses for lack of information or knowledge. Hence, it was individuals in government institutions that put a barrier in place so that the researcher could not conduct the interview due to fear of being exposed.

The researcher decided to continue despite the rejection and decided to pursue other ways of gaining trust and access. The approach was then changed from a direct to an indirect approach of building relationships and making friends. This was facilitated by the fact that the researcher originates from the Katanga Copper Belt. The researcher managed to convince many opponents that the study would benefit the company and the institution, and add value to their business. Therefore, it was imperative to be objective and have no hidden agendas.

The relationships built allowed the researcher to practice the snowball sampling technique by asking key respondents to assist in ensuring that legal advisors in the mining companies are willing to participate in the study. The researcher’s attitude and ability to adapt to the new situation and the environment helped the study to achieve its goals.

4.6.2 Local community expectations

As stated above, fieldwork studies are always exposed to surprises especially when they are conducted in poor communities. This is because some members of the local community see the study conducted in their areas as an opportunity to ask for a job or favours such as cigarette or food before the interview. The study faced these challenges mostly in low-income areas of Gécamines compounds, Ruashi and Dilala.

The fact that the researcher is based in South Africa, studying at a South African university, was equated with being the researcher being rich. Therefore some residents asked how much they would be getting paid for being part of the study. The answer to this question was always the same, their participation in the study is voluntary, and their approval to continue or not is required. At the sound of this answer, some were not interested in giving their attention, especially unemployed people. However, at this stage, female respondents were more willing to participate in the study freely than their male counterparts.

In order to avoid falling into being a source of financial gain for some local respondents, the researcher decided to stay in the community and visit community churches as well as the local businesses. This strategy helped in gaining local community acceptance. The second thing that helped in overcoming local community expectations was the fact that the researcher stayed with friend and family. This situation allowed for the explanation of the primary objectives of the study and the possible outcomes, to some of the people in the communities. This resulted in the spread of the word of the study and allowed the researcher to gain easy access to people's homes. However, irrespective of this progress, some community members have complained about the fact that they have not seen the results of prior research conducted in their community. It can be concluded with confidence, that the researcher's integration into the local community helped the study to approach the pastor and other community leaders to spread the word about the research. Also, based on word of mouth, community expectations were clarified.

4.6.3 Time constraint

Although the study was limited to the Katanga Copper Belt zone only, the time constraint was a significant challenge in the field study. This constraint came in different forms that were grouped into two categories; travel and working time in the field and the duration of the official interviews. The Copper Belt of Katanga covers an area of about 1200 000 km^2 and the distance between the city of Lubumbashi, and the city of Kolwezi is 300 km. So, the researcher spent much time travelling between the two cities. The cause of the regular trips between Lubumbashi and Kolwezi was because it was necessary to meet the key informants or officials for the conditions of time and place of the interviews. As a result, the researcher had to conduct four to six interviews in one week between the two cities. Also, almost all the mining companies operating in Kolwezi had their headquarters in Lubumbashi. As a result, initial contacts were made in Lubumbashi and interviews were

held in Kolwezi where the principal operations are taking place.

In addition to travelling, the time spent working in the field was also minimal. The researcher wanted to have more time with members of the local community to check their answers and views on some critical issues such as community-based mining interventions, community participation projects and community development. It was noted that some community members were reluctant to participate in the study. Later, it was discovered that it was because of their political affiliation or fear of losing their jobs. Most of them feared that specific information they provided could endanger their lives or their family, regardless of the confidentiality agreement. These issues have been strategically overcome by cross-checking information with other local communities from different streets or places in the study area.

4.7 Chapter conclusion

The researcher decided to report on factual findings and interpretation made from observations which were based on literature reviews, theoretical considerations and documents analysis. It is important to remember that the primary aims of the study in conducting the empirical study were to listen and learn from people well vested in mining activities and those affected in the Katanga Copper Belt. This was done through semi-structured interviews and considering the challenges associated with the administration of EL in the mining sector.

Furthermore, this chapter included the local community surveys that are used as indicators on the manner in which local community lives are connected to mining activities. It also included an in-depth analysis of legislative and documents analysis in order to evaluate the manner in which different legislation applicable to mining activities has captured the concepts of sustainable development.

The approach did not prevent the researcher from observing and getting the reality of an unequal society in which the study was conducted. This aspect of the empirical study was captured through personal notes and pictures used during data analysis.

CHAPTER FIVE

EMPIRICAL EVIDENCE

5.1 Introduction

The focus of this chapter is to present the empirical data collected from the fieldwork conducted in the Katanga Copper Belt of the DRC between November 2015 and July 2016. The starting point of this chapter is to underline what the research aimed to investigate the research questions highlighted in chapter one. Thus, key themes were extracted from the research questions and relevant data drawn from the content. Using this approach, the study first identified the legal framework through policies, legislation, and literature within which mining operates in the Katanga Copper belt. In doing so, the study identified and classified various institutional setup and systematic challenges that hinder the proper administration of environmental legislation in the mining sector. The study to some degree uncovered a governance gap in the mining sector of the Katanga Copper Belt that has affected the role of environmental legislation in promoting sustainable mining and leading to environmental degradation and community poverty.

The data reported in this chapter were obtained using the qualitative research methods because it allowed the use of multiple research and data collection methods to understand a specific phenomenon. Hence, the data reported here were collected using policy and document reviews, interviews, surveys, participatory observation. Therefore, based on the research questions of the study and the data collected, this chapter divided into four sections. The first section reports the legal or legislative framework which regulates sustainable mining practice in the Katanga Copper. The second section, report on the manner in which the environmental legislation promote sustainable mining practice and environmental stewardship. This section also includes the analysis of the institutional framework for the administration of environmental legislation in the mining sector. The third section, report on the current mining practice in relation to the promotion of community wellbeing and sustainability in the study area. The last section reports on the identified challenges in fostering stakeholder's engagement in the mining community of the Katanga copper belt.

5.2 Legislative framework for the promotion of sustainable mining practice in Katanga

The main objective of this section was to establish existing environmental legislation and legal frameworks put in place by the DRC that are aimed at promoting sustainable mining practices in the Katanga Copper Belt. In order for a mine to be considered sustainable, it must be safe, demonstrate best practices in environmental management and community engagement, be economically efficient and use mineral resources efficiently (Laurance, 2011). Therefore, the investigation and discussion on environmental legislation and policy framework including the institutional framework were based on legislation and the institution's ability and capacity to guide mining operations to a point where sustainability is achieved. The study identified an ensemble of environmental legislation and policies put in place by the government of the DRC for the promotion of sustainable mining practices in the Katanga Copper Belt. Nevertheless, it must be noted that some of this legislation is outdated and need to be updated and adapted to accommodate new challenges (i.e. environment, social and economy).

The key legislation for sustainable mining practices in the DRC is Article 53 and 58 of the Constitution of February 2006 which stipulates that "Everyone has the right to a healthy environment conducive to its full development. The State takes care of the protection of the environment and the health of the populations". Article 58 of the Constitution gives all Congolese citizens the right to enjoy the proceeds of natural resources. It provides that: "All Congolese have the right to enjoy the national wealth. The State has the duty to redistribute equitably and guaranty the right to development".

The Environment Law No. 11/009 of 09 July 2011 pays particular attention to the sustainable management of the environment and the social development of local communities. This law aims to promote the sustainable management of natural resources, to prevent risks, to fight against forms of pollution and nuisances, and to improve the quality of life of populations while respecting the ecological balance. Article 9 of the Environmental Law No. 11-009 of 9 July 2011 makes provision for community engagement in areas where mining activities are taking place. It states that "All Congolese have the right to participate in the decision-making process in the field of environmental management and natural resources. The public is called upon to participate in the process by which public authorities formulate environmental policies, programs, plans and regulations within the

public and equitable framework defined and established by that authority". Furthermore, Article 10 of the 2011 Environmental Law imposes on the national government, the province and all the decentralised entities the "obligation to control and organise human, artisanal or industrial activities, to take preventive or corrective measures against the negative impact of their activities on the environment by using appropriate technologies with less polluting capacity and an acceptable economic cost".

According to Ingram (2017), vegetation and wildlife are protected by the Forest Code Law 011-2002 of 29 August 2002**.** This legislation deals with clearing and erosion problems. The code prohibits "all acts of deforestation in areas exposed to the risk of erosion and flooding; any deforestation over a distance of 50 meters on either side of the watercourses and within a 100-meter radius of their sources". In addition, the code specifies that "any deforestation must be compensated by a reforestation equivalent in quality and area to the initial forest cover ... and requires obtaining a deforestation permit for an area of 2 ha".

Nature conservation issues are covered under the Nature Conservation Law No. 14-003 of 11 February 2014. The aim of this law is to support the national government plans regarding the conservation of nature. It must be noted that this new conservation law rescinds the outdated Conservation of Nature Ordinance-Law No. 69-041 of 22 August 1969. The new nature conservation law introduced new innovations, such as public participation in the decision- making process, local community participation in the strategic steps for establishing and managing protected areas, social and environmental impact assessments for all projects affecting the protected areas, traditional knowledge on nature conservation, access to biological and genetic resources, and just and equitable benefits derived from resources. The Nature Conservation Law works in conjunction with the Creation of Safeguarded Sectors Law of 22 July 1975, which defines the constraints which have to be met in the context of impact studies in specific territories such as reserved natural resources and safeguarded sectors. It also prohibits the absolute deforestation or wood fires in the concession or in all the lands forming the area called Inga site.

The protection and use of physical resources such as soil and water are governed by several decrees and legislation, namely, the Decree of May 6, 1952 on the concessions and administration of water, lakes and rivers, and Ordinance of 1 July 1914 on the population and the contamination of sources, lakes, rivers and parts of watercourses. Ordinance 52-443 of 21 December 1952 sets down rules and regulations for the use of water sources,

underground aquifers, lakes and rivers, to prevent pollution and waste of water and to control the exercise of water rights. Furthermore, Ordinance 64-650 of 22 December 1958 provides regulations on the provisional measures of the inland waterway, engineering structures and port facilities and, Ordinance 29-569 of 21 December 1958 provides regulations for irrigated crops with a view to protecting public health.

Specific to mining activities in the Katanga Copper Belt is Law No. 007-2002 of 11 July 2002 on the Mining Code. While defining the conditions of opening and exploiting the mineral deposits, it takes environmental, social and economic concerns into consideration. In addition to the Mining Code, there is Decree No. 038-2003 of 26 March 2003 on Mining Regulations. Article 21 and Article 24 of the mining regulations require public participation during environmental assessments and project approval process. These texts are complemented by the Land Tenure Act of 1973, under which the government grants to businesses and diggers the right to use certain lands for extraction. The Mining Code regulates artisanal and industrial mining which include prospecting, research, exploitation, processing, transportation and marketing based on the principle that the soil and subsoil belong to the state. Under the provisions of the Mining Code, the investor should comply with the code of conduct provided for by the mining regulations, to develop and obtain approval before starting any mineral research. However, the investor must also submit an Environmental Impact Assessment (EIA) for approval before any operational work can commence. The EIA must be accompanied by an Environmental Project Management Plan (EMPP) showing the manner in which the company plans to manage all identified and future environmental challenges. The mining regulations specify various obligations, subordinating all mining research and exploitation operations to the presentation and prior approval of an Environmental Adjustment Plan, except for prospecting and marketing operations, and artisanal mining.

According to Revuelta (2018), mining activities can have a long-lasting negative impact on cultural heritage, thus in the DRC, the protection of cultural heritage is governed under the Order Law No. 71-016 of 15 March 1971 on the protection of cultural property. This law provides for the discovery of remains or objects of interest to art, history or archaeology that are made during excavations or fortuitous. These discoveries must be declared immediately by the inventor or owner to the administrator of the territory or the mayor, who will notify the Minister of Culture. The Minister may, by order, prescribe any measures

necessary for the conservation of remains or objects discovered.

The health and safety of the workers including that of the local community for its part are covered by Article 405 of the Mining Code of 2002 which states that "mining owners must develop and implement a health and safety plan for the benefit of mining workers as well as communities living near the mining operations". Article 451 stresses the need for public consultation and states that "a public consultation must be organised between the communities affected by the proposed project, the consultation must take place during the EIA process which must actively involve the local communities, but the public consultation must in all fairness allow the local communities to appreciate exploitation and work program offered by the mining project". In addition, Article 8 of the mining regulations of 2003 states that "after public consultation and with all stakeholders, local communities have the right to be informed of the final decision". The information must also include information on the substance used and hazardous activities to be undertaken. As a result, the public must become involved in the environmental, as well as the settlement and resettlement project development process. Article 10 of the Environmental Law No. 11-009 of July 9, 2011, provides cost-effective measures for prevention of pollution, reduction initiatives as well as site rehabilitation measures that are the responsibility of the polluter. It is important to note that Article 10 of Environmental Law is an expression of Article 54 of the Constitution of the DRC which lays the foundation for the owners of mining rights to repair the damage caused by pollution of the environment. It must also be noted that the mining rules and regulations set out standard principles for minimising or repairing any environmental mine disasters that could harm life on Earth. These principles include the polluter pays principle (Article 12), environmental audits required (Article 23), environmental response fund (Section 25), and mandatory restoration (Article 44).

Environmental quality standards for mining operations, including a detailed approach to monitoring frequency, monitoring locations, calculations and measurement techniques, are also included in Annex IX of the Mining Code of 2002. Concerning monitoring, under the Mining Code of 2002 and the Mining Regulations of 2003, all mining companies are required to comply with environmental legislation, and government institutions are required to monitor compliance.

The health and safety aspect of sustainable mining practice in the Katanga Copper Belt is covered by the Labour Code Law No. 15-2002 of 16 October 2002. It aims, among

other things, to protect the health and safety of workers, to provide a medical service, to guarantee a minimum wage and to regulate working conditions. It is also important here to note the Departmental Order 78-004 of 3 January 1978 on the establishment of health and safety committees in companies.

The procedures for conducting EIAs in the DRC are organised under the Ministerial Order No. 043 / CAB / MIN / ECN-EF / 2006 of 08 December 2006. This legislation provides the frames within which to carry out an Environmental and Social Impact Assessment (ESIA) and ensure that a project complies with existing environmental standards. The ESIA must be carried out by the mining promoter and under his sole responsibility. The terms of reference will be established by the supervising administration of the relevant business in liaison with the project promoter, based on general and sectoral guidelines which will then be developed by the environmental authority. The environmental acceptability of the project will be decided by the latter. It may be subject to conditions relating to amendments to be introduced or to mitigation and compensation measures to be taken.

Another important legislation pertaining to sustainable mining practices in the Katanga Copper Belt is Law 73-021 of 20 July 1973 on land, compensation and resettlement. This deals with the general system of property, land, real estate, and the regime of security. With regards to Article 34 of the Constitution of 18 February 2006, any decision to expropriate falls within the competence of the legislative power. Taking into account this Article of the Constitution, Law No. 77-001 of the 22 February 2002 describes the procedures of expropriation which should be applied with rigour.

Besides the national environmental legislation and policies, there is a number of international conventions on the environment to which the DRC is a signatory and which are applied to mining activities. **Table 5.1:** below represents the international environmental multilateral agreements applicable to mining activities of the Katanga Copper belt.

Table 5.1: Signed international environmental conventions applicable to mining activities of the DRC

Multilateral Agreement or Convention	**Country or city of adoption**
Convention relating to the conservation of fauna and flora in the natural state	London (United Kingdom) 14 January 1936
African Convention on the Conservation of Nature and Natural Resources	Alger (Algeria) 15 September 1968
Convention on Wetlands of International Importance Especially as Waterfowl Habitat	Ramsar (Iran) 2 February 1971
Convention on the Protection of the World Cultural and Natural Heritage	Pari (France) 23 November 1972
Convention on the Conservation of Wild Species of Flora and Fauna Threats of Extinction	Washington (USA) 3 March 1973
Convention on the Convention on Migratory Species of Wild Animals.	Baune (Allemagne) 23 June 1979
Convention on the Protection of the World Cultural and Natural Heritage	Paris (France) 23 June 1979
International Tropical Timber Agreement	Geneva (Suisse) 18 November 1982
United Nations Convention on Climate Change	Rio de Janeiro (Brazil) 4 June 1994
Convention on Biological Diversity	Rio de Janeiro (Brazil) 4 June 1994
United Nations Convention against Desertification	17 October 1995
Addressing the conversation and sustainable management of the forest ecosystem in central Africa	Brazzaville (Congo) 5 February 2005

The international environmental conventions applied to the mining activities mostly to compensate on the absence of the DRC legislation. The Congolese government in its capacity of a regulator and its duty to protect the natural environment acknowledge through its Constitution of February 18, 2006, that in the absence of environmental legislation environmental conventions signed by the DRC are applied to protect the environment (Mazalto, 2009). Nevertheless, the monitoring and evaluation of international environmental

convention application in the mining of the Katanga copper are very difficult due to the lack of financial and qualified human resources (NGO representative, 2017).

5.3 Strength and weakness of environmental legislation applicable to mining for the promotion of sustainable mining

The DRC has put in place legislation that has captured sustainable development principles and put in place strategic framework for the protection of the environment and local community development. In this section, the study discussed the main environmental management tools that the legislation learn on for the promotion of sustainable mining practice in the Katanga Copper Belt. These are the environmental impact assessment and environmental management plans.

5.3.1 Overview of the environmental impact assessment and the environmental management plan of a mining project

Article 21 of Act No. 11/009 of 9 July 2011 on Basic Environmental Principles provides that any development, exploitation, infrastructure, industrial, commercial, agricultural, forestry, mining, telecommunication or other likely to have an impact on the environment, is subject to a preliminary environmental and social impact study, with its management plan, duly approved. Article 45 of the Mining Regulations also captures this provision.

Therefore, Article 1 and 2 of the Mining Regulations provide that "prior to the preparation of its environmental impact assessment and its project environmental management plan, the applicant for the mines or a permanent mining exploitation right shall careful internalised and plan it approach in accordance with its EIA and PGEP to the technical environmental regulations' (mining regulation article 1,2,3,4). In essence, the law reveals that the planning and writing of an environmental impact study begin with the presentation of the mining project. The presentation of the project must describe the feasibility study, which must also include the quality of the soil, vegetation related to agricultural activities. The fauna and flora are described outright to see if the operations would affect them and pretend to degrade them. Furthermore, the study should explain how the hydrology would be restored when this description is taken into consideration and this shows the presence of the groundwater to which local community depend for water supply

Article 4 latera B of annexe IX of the mining regulations states that "an analysis of the impacts of exploitation operations on the environment". The C Literal prescribes that "a

program of mitigation measures and project presentation and description of social aspects should be included in this environmental impact study and social project. Among other things, this concerns its aesthetic aspect, particularly the construction of walls to separate the area where the local community lives from the project area. The project must also respect the local culture and the native population and provide for the creation of recreation centre such as a stadium with an imposing and new generation infrastructure, the construction of public latrines for hospitals and dispensaries as well as schools.

In essence, by its extractive nature, the mining project must carry out a social and environmental study to determine the social and environmental risks of the project while proposing measures of attenuation for proper management and appropriation of the project. The same is true of the action plan to describe and categorise the actions necessary to implement the measures of attenuation, the corrective measures and the follow-up measures required to manage the identified impacts and risks.

Finally, communities that may be affected by a project must be consulted in a culturally appropriate and appropriate manner to ensure their free, prior and informed consultation. Their involvement should be facilitated as a means of determining whether a project adequately addresses the concerns of such local communities. The operator must make available to the public the evaluation documents and the action plan within a reasonable time and in as short a time as possible and in the relevant local language, and document the process and the results of the consultation. However, the data collected in the study area shows 80 % of the respondent were not consulted and were not aware of the mining project to affect their environment.

Article 1 (19) of the Mining Code, which is devoted to the environmental impact study, recognises it as the preliminary scientific analysis of the foreseeable potential impacts of a given environmental activity and the examination of the permitting acceptance of the environmental impact. Hence, it ensures the integrity of the environment within the limits of the best available technologies at an economically viable cost. Furthermore, article 41 of the same provision contains the environmental management plan EMP of the project, as the project's environmental management agenda book consisting of a program for the implementation and monitoring of the measures envisaged by the project. EIA to remove, reduce and possibly offset the damaging effects of the project on the environment. This definition does not differ from that given by Law No. 11/009 of 09 July 2011 on basic

principles relating to the protection of the environment. However, according to Kashala (2012), it is appropriate to point out that the Legislature has added in the wording of this provision the term "social" without specifying what it consists of.

5.3.1.1 Weakness

The legislator of the Mining Code of 2002 in point 40 Article 1 did not confine himself to enumerating the commitments in the matter of the protection of the environment that must be respected by all mining holder. Nevertheless, in the proper order, the mining holder submits financial security representing the guarantee of the cost of the process of attenuation and rehabilitation, at the time of the start-up or the start-up of all its activities. According to Article 2 (19) of the Environmental Law of 2011" the environmental and social impact assessment, is a systematic process of identification, prevention, evaluation and reduction of physical, ecological, aesthetic and social effects. It is prerequisite for the realisation of a development project, installation or implantation of an industrial, agricultural or other unit and making it possible to appreciate the direct or indirect consequences on the environment". This definition is quite different from that contained in the mining code and the legislator did not want this time want to freeze the considerations taken by the one of the mining code of 202 and integrate it into his (article 2 of the environmental law). Title IX article 39 to 42 of the mining regulations make provision for the impacts of mining operations in the following way: "the applicant identifies the positive and negative impacts direct or indirect or risky impacts of its exploitation operations on the environment within its perimeter and in the perimeter surrounding area that will be affected by the operations. It analyses each impact with regard to the biological and sociological physical environment ". However, article 40 of the same law goes on to state that "in the quantitative evaluation of each impact caused by its operations, the applicant must specify the extent of the impact and the spatial dimension; the duration of the impacts and the irreversible character; the level of uncertainty of the impacts in relation to the feasibility of the estimates; the cumulative effect, such as the link between the affected component and other components; The intensity or extent of the impact with respect to the degree of disturbance of the environment considered to the degree of sensitivity, vulnerability of unit or rarity of the component considered; The frequency of the impact and the probability that the impact occurs either intermittently or occasionally; The value of the component for the potentially affected human population and the risks to the safety and well-being of this population.

Article 41 states that "for each impact analysis, the applicant determines all project operations and suspicious to produce such impacts" and Article 42 analyses the nature of each impact when it states that: "the analysis of negative impacts of the project on the perimeter and surrounding area of the perimeter determines the nature of the risk to the health and well-being of local community and employees, followed by the risk of degradative and air pollution of surface and underground water and soil.

Reading the combination of legal environmental provisions in the mining sector implies that mining companies formally adopt paper-based measures to ensure social welfare including a duly approved environmental policy and undertake to develop and promote a culture of environmental stewardship both within society and in the community. With regard to the allegations developed above, it is not extreme to say that the practice is disappointing as long as one makes descents in the surrounding environment. The observation of the surrounding millennium mining activities in the city of Lubumbashi has a macabre appearance, the most striking case is first the Tshiamilemba neighbourhood and Kabetcha in the local municipality of Kampemba, in the surrounding facilities of Rwashi mining and the company of the Congo Dong Fang Mining International (CDM). The second alarming environmental disaster is observed in the adjoining area of the inhabitants living along the Naviundu water stream that is destroyed. Hence, the question that everyone is asking is that the impact study was done if yes why it is not applied. This is to say that, polluting yes, but not crossing the threshold of impacts listed in your plan and decreasing or reducing the degree of pollution is currently exposed to all forms of environmental degradation, and this places us in the right place to the point of seeing the aspect of the program of measures of attenuation

5.3.2 Presentation of project mitigation measures

The presentation of mitigation measures obligations is specified in Article 204 of the Mining Code, which states that: “it also contains the measures envisaged for the protection of the environment, the elimination or transfer of pollution and the reconstruction of sites as well as to verify the effectiveness of the said measures”. Annex IX in its title V Articles 45 and 44 reaffirms that: " the applicant for a right to use permanent mines is required to present the program of measures of mitigation and remediation reducing or eliminating all the negative environmental impacts of the projects as described in articles 39 to 42 above, reviewed including those related to sensitive and restricted areas, it also describes its project environmental management plan which consists of the implementation "(Mining regulation

2003, Article 43 to 44). Security financing mitigation measures and rehabilitation of the environment Paragraph 4 of Article 204 of the Mining Code imposes on the mining operator this legal requirement stipulating, "The holder of mining and quarrying rights is obliged to provide security to ensure the fulfilment of their environmental obligations during the search and where the exploitation is taking place. In addition, the holder of the mining rights is authorised to constitute a provision for rehabilitation of the environment ". In addition, article 124 stipulates that:" the operator is obliged to describe the detailed budget of the program of the proposed mitigation and rehabilitation measure, the budget presents the total estimated costs, the duration of the remedial work and the proposed rehabilitation are financed and the means of financing are available even if the operator cannot achieve the same. It must be noted here that, any mining operator before starting operations on a well-defined site is required to disclose a budget incorporating its program for the reduction or removal and the rehabilitation of the site. The program must include any prejudice that may arise or arising from this program by mentioning all the related costs incurred for that purpose, including the cost, the measures taken, and the duration.

5.3.3 Public consultation and stakeholder engagement

The incumbent is only liable for damage to the environment by its activities to the extent that it does not comply with the terms of its approved Environmental Plan, including modifications during the project, or violates any of the environmental obligations under section (Article 405). In case of cessation of a mining right cause and in accordance with the provisions of Article 186 of the Mining Code, an environmental audit of the exploitation site concerned by the transfer is conducted. In fact, the audit of the environmental responsibilities and obligations of the previous owner during the period in which he was the owner of the mining right in question. The costs and charges relating thereto shall be borne by the previous owner, without prejudice to the provisions of the preceding paragraph and in accordance with Article 182 of the Mining Code. The holder who acquires his mining or quarrying rights assumes, on behalf of and on behalf of the transferor, the environmental obligations vis-à-vis the State, unless the transferor has obtained the attestation of his environmental obligations provided for in Chapter VII of this Title. - The holder who acquires his mining or quarrying right by granting is not responsible for damages and damage caused by persons who have occupied his perimeter before him or works inside it. However, the new owner is obliged to take into account the damage in its Environmental Plan and to demonstrate mitigation measures and rehabilitation that it proposes. Furthermore, the new owner must demonstrate

that its operations will not have an aggravating effect on existing damage that may affect the health and safety of workers or the population or sensitive environments.

5.3.4 Penalties for contraventions of environmental obligations

1. The investigation of the breach of environmental obligations (Article 569)

Failure to comply with the environmental regulations is confirmed by the Inspector and Agents of the Mining Environment Protection Department or by the Inspectors and Agents of the Mining Direction or the Titular Investigation Directorate immediately in case imminent danger or within a period not exceeding ten days for other cases. The holder of a mining right has a period of ten days from the notification to present his means of defence, without prejudice to the provisions of Article 312 of the Mining Code.

2. Suspension of mining or quarrying operations (sections 570)

Without prejudice to the provisions of Article 292 of the Mining Code, any person who without the justification of force majeure, contravenes his environmental obligations as described in Title XVIII of this Decree and contained in his Environmental Plan is subject to the procedure and the following sanctions:

The breach is notified to the holder of mining or quarry right with mentions of the ninety-day period to remedy under penalty of suspension of mining operations:

- If at the end of this period of ninety days, the inspector or agent to order the suspension of mining or quarrying activities for thirty days;

- If the holder of the Mining or Quarry right does not attempt to remedy a default during the thirty days of the suspension, the suspension of mining or quarrying operations is sixty days in advance and the initial penalty is doubled;

- If at the end of the sixty days, the holder of the mining or quarry right still has not remedied the breach, the suspension of the mining or quarrying operations is 90 days and the initial penalty is tripled;

- If, at the end of the ninety days, the holder of the Mining Law or the Persian quarrymen in the breach, the suspension of the mining operations or quarry is 90 days and the initial

penalty is quadrupled either the mining or quarrying operations are definitively suspended for the serious cases.

Nevertheless, for any failure directly endangering the life or health of one or more persons, the Minister may immediately, suspend mining or quarry operations for the time necessary for the implementation of the adequate mitigating measures.

3. Confiscation of the financial security of environmental rehabilitation (Article 571) In case of breach of environmental obligations incumbent on the mining holder, the financial security of the environment is reclaimed in accordance with Articles 402 to 405 of this Decree.

5.4 Environmental legislation governance: Mapping environmental legislation administration for the promotion of sustainable mining and environmental stewardship

This section reports primarily on how different stakeholders in the mining sector integrate sustainable mining indicators into their decision-making process, as recommended by the country's environmental legislation and policies because sustainability principle is an integrative concept for decision makers (Gibson, 2006). As a result, interviews were conducted with representatives of mining companies, government institutions and NGOs to establish their approach to sustainable mining practices. A question was asked about what the current approach is to the application of environmental legislation for the promotion of sustainable mining practices.

The study reveals that all the mining companies surveyed, have conducted an EIA prior to the commencement of mining activities and have an environmental management plan in place. They adhere to the Global Reporting Initiative (GRI) and regularly comply with the International Council on Mining and Metals Sustainable Development Framework. However, the majority (six) of the mining company's respondents pointed out the fact that the implementation and monitoring approach of environmental legislation from government officials is not adequate and efficient due to bureaucracy, unqualified and corrupt government officials.

"Concerning the application of environmental legislation, the majority of government officials are more concerned with their personal gain than with the well-being of the environment and the local community. Thus, they use environmental legislation to their advantage by identifying the crimes caused by our operations in order to extort money from

the company for their profit rather than promoting a sustainable mining practice ... some mining officials exploit this gap instead of denouncing it" (Mining official in Lubumbashi, 2015).

One of the key issues which the study was interested was to establish mining stakeholders approach to sustainable mining practice in relation to environmental legislation implementation. Thus a question was asked to research participants familiar with the implementation of environmental legislation, to know which element of sustainable development or sustainable mining as defined in the study they consider first in their decision-making process. In answering this question respondents were asked to rank from efficiency, safety, environment, economy and the community. The results are presented below in **Table 5.2**.

By order of importance starting from 1 to 5; where 1 = the first priority and 5 the last priority

Table 5.2: Official's respondent sequence approach to the sustainable mining application

INSTITUTIONS	Sustainable Mining Practice Indicators	Frequency
Cadastral Mining	Efficiency	1
	Safety	1
	Environment	2
	Economy	1
	Community	2
Mining Division	Efficiency	1
	Safety	1
	Environment	2
	Economy	1
	Community	3
Environmental Division	Efficiency	1
	Safety	1
	Environment	1
	Economy	2
	Community	2
Police of Mines	Efficiency	2
	Safety	1
	Environment	1
	Economy	3
	Community	1
Justice Division	Efficiency	1
	Safety	1
	Environment	2
	Economy	3
	Community	1
Mining Companies	Efficiency	1
	Safety	1
	Environment	1
	Economy	1
	Community	2
Prosecutors	Efficiency	3
	Safety	1
	Environment	1
	Economy	1
	Community	2
Advocates	Efficiency	2
	Safety	1
	Environment	2
	Economy	1
	Community	1
NGOs	Efficiency	3
	Safety	1
	Environment	1
	Economy	2

	Community	1

The results presented in table **5.7** shows that the mining companies' respondents consider the economic aspect (profitability) first. Thereafter, the social and environmental aspects are considered. The Department of Mining considers the environment, social and economic aspects. Respondents from the environment and NGO respondents stressed that all aspect of sustainable development should receive equal attention. Nonetheless, all key stakeholders concluded that they faced significant challenges in creating a balance between different aspect of sustainable development and ethical considerations. The key stakeholders were asked to give their impression of the current environmental legislation application approach for the promotion of sustainable mining since 2002 concerning the achievement of the sustainability pillars. Furthermore, the results presented in **Table 5.2** interestingly points to the fact that all the mining companies' respondents stressed that besides economic considerations, efficiency factors received much consideration. Mining company respondents suggest that it is the economic efficiency that plays a key role in the achieving of other sustainability objectives. Thus a research participant representing a mining company operating the city of Kolwezi argues that:

"*...for obvious reasons, we strive to be first economically efficient, because it on this basis that we can effectively engage in community development projects. Nevertheless, social and environmental impacts of the projects are identified from the beginning of the project in accordance with environmental legislation of the country and financial and international regulations*". This view suggests that economic considerations play an important role in the promotion of sustainable mining practices.

Furthermore, the study was focused on the research participant involved in the implementation of environmental legislation in the mining sector judge the level of their intervention in upholding the legislation. Therefore, a question was asked to key respondents to rate from 0 to 4 where 0=much worse and 4 much better the performance of each element of sustainable mining since the promulgation of mining of 2002 to now. In answering this question, respondents were asked to rank from efficiency, safety, environment, economy and the community their performance level and to rank each other in the upholding process of environmental legislation in the Katanga Copper Belt. The results are presented below in **Table 5.3**.

0= much worse, 1= worse, 2= same, 3= better 4= much better

Public and private institutions involved in the mining sector	Sustainable Mining Indicators																								
	Economy					Environment					Community					Efficiency					Safety				
	0	1	2	3	4	0	1	2	3	4	0	1	2	3	4	0	1	2	3	4	0	1	2	3	4
Cadastral Mining			x					x					x						x					x	
Mining Division				x				x					x						x					x	
Environmental Division			x						x				x						x					x	
Police of Mines			x					x					x						x					x	
Mining Companies			x						x				x						x					x	
Justice Division			x					x				x						x					x		
Prosecutors				x				x					x							x				x	
Advocates			x																	x			x		
NGOs				x			x						x					x					x		
Labour Association				x				x					x						x					x	

Table 5.3: Official perceptions of environmental legislation implementation for promoting sustainable mining

The result presented in **Table 5.3** shows that out of 10 institutional respondents from 8 institutions agreed that globally the economy is doing well while 5 respondents out of 10 institutions note that the management of the environmental quality as not improve and still the same, as well as 8 representatives form 8 institutions out 10, agreed that the socio-economic situation of the local community has not improved. Nevertheless, the responses provided by institutional participant seemed to be biased, thus the study referred to personal note and observation to assess the effects of the implementation of the environmental legislation on the ground.

Therefore, even though the economic indicators or efficiency seemed to be more on the positive outlook from mining activities, the study found that economic gains from mining activities struggled to reflect on the local community through improved community well-being. In this regard, the results show that the majority of institutional respondents 8 out 10 have agreed that overall social life is the same, no significant changes have occurred. One of the key issues identified in the discussion with mining company representatives was that government officials lack professionalism and technical knowledge regarding environmental monitoring and evaluation. Therefore, even though the issue of education was not part of the investigation, it becomes clear that it was important for the study to establish the level of education of officials and household respondents as well as stablish how they relate to their environment in relation to mining activities.

5.4.1 Institutional framework for the administration of EL for the promotion of sustainable mining in the Katanga copper belt

Extracts from literature reveal that environmental legislation application is delegated to the judicial and administrative state institutions, to ensure the success of the protection and promotion of the environmental rights for the good of the whole community (Bintu, 2010). More importantly, the success of sustainable mining practices depends on the active and efficient interactions between the mining sector and governments (ICMM, 2006). Nevertheless, the organisational and institutional frameworks through which decisions are made are of great importance (Himley, 2010). More so is the fact that the government, in general, has an important role to play in regulating and facilitating access to natural resources and environmental management.

The analysis of different policies and legislation applicable to mining activities including

interviews with officials revealed that the DRC has put in place an institutional framework in charge of the administration of environmental legislation in the mining sector. The institutional framework is as follows:

- The Ministry of the Environment, Nature Conservation and Sustainable Development (MECNDD) prepares and implements government policy in the areas of environment and nature protection. As such, it is directly responsible for the fight against pollution of all kinds and against desertification, the protection and regeneration of soils, forests and other wooded areas, the rational exploitation of forest resources as well as the defence of animal and plant species and natural environments. The department has authority over the parks and the nature reserves. The MECNDD has within it specialised departments and cells. These are the Forest Management Directorate, the Nature Conservancy Branch, the Control and Internal Audit Division (DCVI) for the management and monitoring of activities at wildlife and plant control stations, the Sustainable Development Department and the Directorate of Sanitation. Other structures which are attached to the MECNDD include the Congolese Institute of Nature Conservation (ICCN) and the Congolese Environment Agency (ACE). The structures which exist at a provincial level include the Provincial Coordination of the Environment (CPE) and the Urban Coordination of the Environment (CUE). In conducting and monitoring ESIA procedures, the MECNDD relies on ACE. This is the direct body for implementing the policy and assessing the environmental and social impacts of human activities and development in the DRC.

- The ACE was created by Decree No. 14-030 of 18 November 2014 is responsible for conducting and coordinating the process of environmental and social evaluation in the DRC. Its mission is to evaluate and approve all environmental and social studies, as well as to monitor their implementation. Without prejudice to the provisions of Article 71 of Law No. 11-009 of 09 July 2011 on the basic principles relating to the protection of the environment, it shall take into account the protection of the environment where any development, infrastructure or operation of any industrial, commercial, agricultural, forestry, mining, telecommunication or other activities are likely to have an impact on the environment. ACE validates the ESIA reports, Environmental and Social Impact Diagnostics (EIDD), Environmental and

Social Management Plans (ESMP) and Environmental and Social Compliance Plans (PMCS). It also does administrative and technical follow-ups of any projects in progress. This includes an analysis of field reports, inspection and environmental audit. ACE has the required human skills in the fields of EIAs and Impact Studies to carry out its mission. However, its material and financial capacities are relatively small to enable it to ensure proper fulfilment of its mission.

- The Ministry of Mines is in charge of mines and ensures that there are implementations and the follow-ups of government policies in the field of mining. As such, it issues the prior authorisation on file analysis of any project for the creation, development and/or operation of an area or a quarry of rubble stones and pebbles. Undoubtedly, the ministry of mines engages the government of the DRC.

- The protection of the Mining Environment Directorate (DPEM) is in charge of activities related to the protection of the environment. It focuses on respecting and protecting the environment and the populations affected by mining and quarrying activities. ACE supports the DPEM in the implementation of the environmental and social component of projects. It is also important to note that the environmental and social management of mining activities affects other institutions such as the Ministry of Public Health, the Ministries of Agriculture, Fisheries, Livestock and Rural Development, and The Ministry of Planning through the mobilisation of financial resources. It also affects the Ministry of Infrastructure, Public Works and Reconstruction through the design, construction, modernisation, development and maintenance of roads, airports, schools, sanitation, social, tourist and sporting infrastructures, public buildings, and the Ministry of Urban Planning and Housing and the Ministry of Land Affairs through the provision of mercurial for the compensation of populations.

- Local authorities, the ordinances establishing and organising local authorities as well as administrative districts give powers to local authorities with regards to the management of their environment. This is under the Legislative Decree of 02 July 1998 on the territorial and administrative organisation of the DRC. According to this decree, the decentralised administrative entities with legal personalities are the province, city, territory and municipality. This decree establishes the distribution of the specific attributes by sector of activity between the central power and the

decentralised administrative entities. The latter was awarded, *inter alia*, the following environmental competences; sector control and, in particular, disinfection in all its forms, protection of classified sites installed in local entities as well as that of monuments and sensitisation of the population to the problems of environmental health. They were also awarded in terms of issuing permits for the operation and control of dangerous establishments, unhealthy drainage and cleaning of wastewater sewers and sewers, and the cleaning, collection and disposal of household wastes.

- Non-Government Actors include the activities of NGOs and are governed by Law No.004-2001 of 20 July 2001. It gives general provisions applicable to non-profit organisations which make up associations and public utility establishments. NGOs participate in the design and implementation of grassroots development policies. Several NGOs, national and international, operate in the environmental management sector and support development sectors in several areas such as in capacity building, information, raising awareness, mobilisation, social support and protection. In some cases, local NGO structures can play an important role in monitoring the implementation of environmental legislation in the mining sector.

Below **Figure 5.1** illustrate government institutions involved in the administration of environmental legislation in the mining sector of the Katanga copper belt and how they connect to each other.

The illustration of government institutions involved in the implementation, monitoring and evaluation of environmental legislation in the Katanga Copper Belt was developed based on environmental legislation applicable to mining activities including the Constitution of 2006, the Mining law of 2002, the Mining Rules of 2006 and the Environmental Law of 2011. The data obtained from the analysis of environmental and mining legislation was presented to institutional study participant for cross check and to establish their working relations with other institutions. The results presented in Figure 5.1 illustrate a web of connection between a number of national, provincial and local governments involved in the implementation role of environmental legislation in the mining sector. Thus, respondents from all 6 mining companies argue that: the multitude of government institutions involved in the application of the environmental legislation in the mining sector of the Katanga copper belt slowed down the efficiency of the laws and is also one of the causes of corruption and environmental degradations.

It must be noted that the overview analysis of institutions involved in the application of the environment and sustainable development of the mining sector of the Katanga copper belt, reveals that, even though mining operations affect many areas of lives, there are too many government institutions and officials involved in the administration of environmental legislation in mining sometimes with the same duties and responsibilities. An example of such is the duplicity of environmental impacts assessment (EIA) by the Department of Environmental Affairs and Sustainable Development with the national ministry of mines and the provincial ministry of mines and the provincial of Environmental Affairs and Tourism.

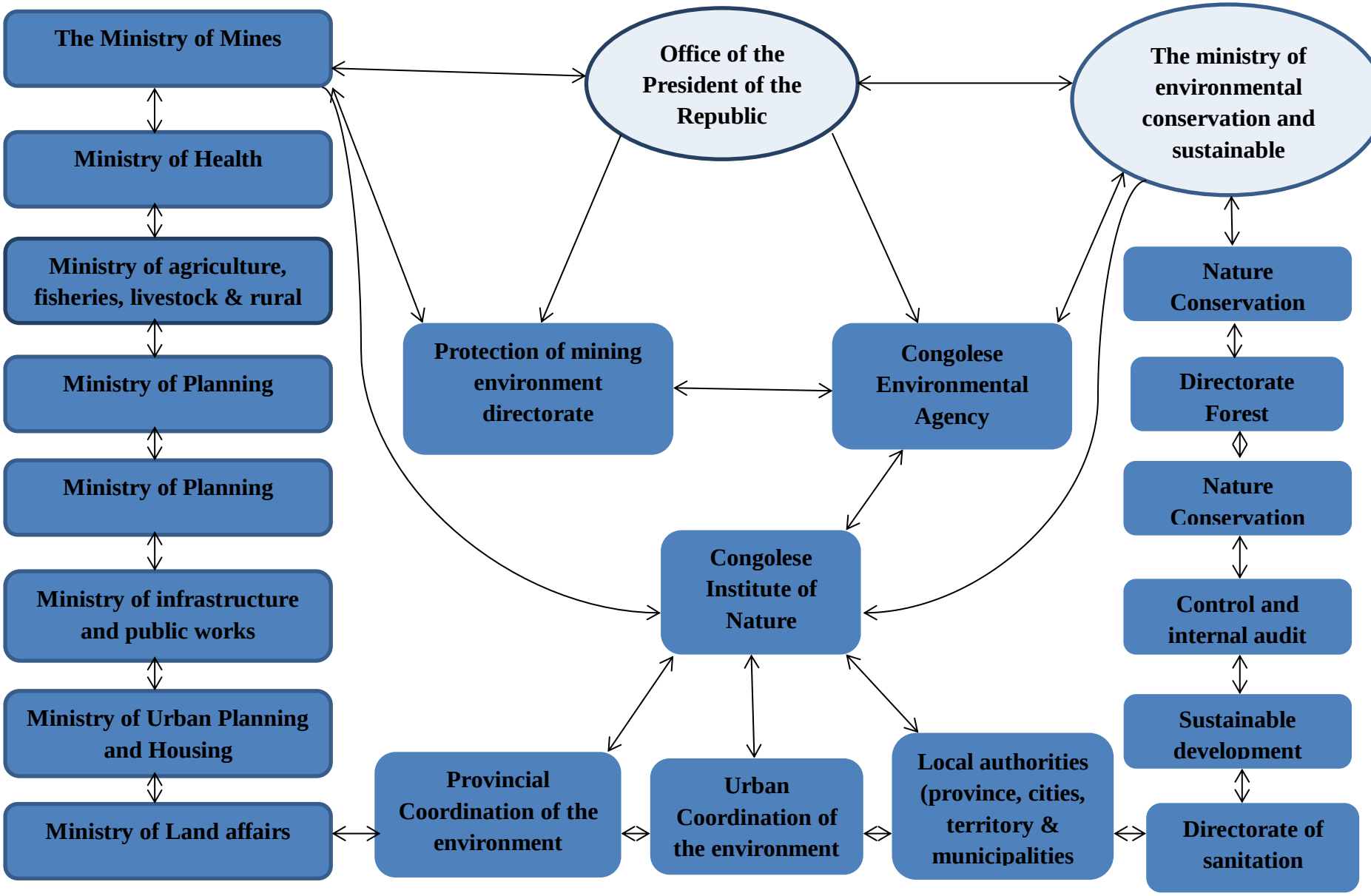


Figure 5.1: Government institutions involved in the implementation of the environmental legislation in the mining sector of the DRC

5.4.2 Integration of environmental legislation in mining activities

The analysis of legislation and policies applicable to mining activities in the DRC shows that legislation makes provision for the integration of environmental legislation and sustainable development of local communities in mining activities of the Katanga Copper Belt. The starting point for the integration of environmental legislation for sustainable mining practice in the Katanga copper belt is the environmental impact assessment (Environmental Management Framework of, 2011; the Mining Code of 2002 and the Mining Regulation of 2003). This has to be conducted and submitted prior to the commencement of mining and every two years thereafter. In addition to the ESIA, mining companies must develop Environmental Management Plans (EMP) which becomes a tool for water, air and soil quality management.

The study found that even though on paper EIAs were conducted and submitted to the institutional framework, the processes of EIA were in many cases biased and not inclusive of all elements of the environmental legislation. For example, right after the implementation of the mining company and beginning of activities in the Rwashi, many streams around the area were contaminated due to the location of mining smelters, which were in close proximity to the community's source of potable water and arable land. This is just one example which shows a shortcoming in the integration of environmental legislation in mining and reveals that a number of EIAs which submitted were not re-evaluated by officials for accuracy and compliance. Furthermore, officials from environmental departments pointed out the legislation weaknesses that had led to confusion among different government institutions in the administration of environmental legislation and policies. For example, the 2002 Mining Code and Mining Regulations of 2003 grant the same environmental management responsibilities to the Mining Division and Environmental Divisions, while the same responsibility is also given to the Provincial Ministers of Mines, Environmental Affairs and Cadastral Mines. As a result, government institutions, such as the Environmental Division, are not included in the EIA assessment process. More confusion for environmental legislation practitioners is the fact that EIA reports are submitted to the National Minister of Mines without including the Katanga Copper Belt Provincial Division of Environmental Affairs to address shortcomings. As a result, the formal system of regulation of the environment and sustainable development of the local community is dysfunctional. The pressure on companies to comply with their plans appears to come more

from international and national civil society organisations and in some case from investors to keep a social certificate to operate.

A mining official points out the fact that *"…the main challenges we are facing when dealing with government officials is that they often seem to be more concerned with identifying offences rather than technical compliance and environmental quality*" (Comment extracted from mining officials of Kolwezi, 2016). Furthermore, "…*identification of shortcomings in environmental legislation compliances by mining company's issued to force mining companies to pay penalties, for personal gain rather than legal compliances. In some cases, government officials arrange for full or partial penalty fees to be paid in bank accounts different from that of the government...*" (Mining officials, 2015). In relation to rampant corruption in the administration of environmental legislation, the study revealed that in most cases mining companies are complicit in corruption and therefore this weakens the effects of environmental legislation. As a result, the crackdown on environmental offenders in the mining sector of the Katanga Copper Belt becomes even more difficult because of the attitude of some mining companies. The only possible and reasonable solution remains prevention in order to minimise the negative impacts of mining activities on the environment and the implementation of socio-economic plans.

5.5 Environmental legislation for sustainable mining practice and the promotion of community wellbeing

One of the key issues which the study was particularly interested in was to understand from the research participant if they felt that the environmental legislation in the DRC and in particular in the Katanga Copper Belt is effectively applied and whether they are promoting sustainable environmental legislation. The question asked to research participant was formulated as follow: The 2006 Constitution of the DRC in article 53 and 58 stipulate that: "Everyone has the right to a healthy environment conducive to its full development. The State takes care of the protection of the environment and the health of the populations". And Article 58 states that: "All Congolese have the right to enjoy the national wealth. The State has the duty to redistribute equitably and guaranty the right to development". Article 9 of the Environmental Law No. 11-009 of 9 July 2011 makes provision for community engagement in areas where mining activities are taking place. It states that "All Congolese have the right to participate in the decision-making process in the field of environmental management and natural resources. The public is called upon to participate in the process by

which public authorities formulate environmental policies, programs, plans and regulations within the public and equitable framework defined and established by that authority". Do you think these laws are efficiently and effectively uphold by the government and mining actors? In answering this question respondent were asked to choose between YES or NO and elaborate on the changes that they have observed in their local community areas as a result of, mining activities. The data collected regarding these questions are presented below in **Table 5.4**.

Table 5.4: General perception of environmental legislation implementation in the mining sector of the Katanga Copper Belt

Nature of Response	**Number of response**	**Percentage**
Yes	78	35.45 %
No	109	49.54 %
Not sure	33	15 %
Total	220	100 %

Field data material (2016)

The results of shows that only 78 participants out of 220 agreed that environmental legislation efficiently applies for better environmental management and improve the quality of lives. However, the majority of respondents 109 said NO according to this category of the respondent, the government institutions and mining stakeholders are not efficiently applying the environmental legislation as provided by the Constitution of the republic and the mining legislation.

Thus, the study asked a follow-up question to study participants to elaborate on the impacts that mining activities have had in their community and the city at large. Thus, in answering this question respondents were asked to rank sustainable mining indicators from much better to much worse using the following indicators: 0= much worse, 1= worse, 2= same, 3= better 4= much better. Local community elaboration was based on the changes observed that had occurred in their area or community as a result of mining activities since 2002. The results of this question are presented in **Table 5.5** below.

Table 5.5: General perception of mining impacts in the Katanga copper belt

Rating	Sustainable mining practice indicators				
	Economy	**Community**	**Environment**	**Safety**	**Efficiency**
Much better	26	38	9	32	60
Better	92	62	34	105	39
Same	72	82	38	39	89
Worse	30	38	97	44	32
Much worse	0	0	42	0	0

Fieldwork work data (2017)

The results presented in table 5.5 above shows that out of 220 respondents 92 agreed that the overall economy is doing better. However, the social well-being of the local community has not improved. 82 respondents argued that the situation had remained the same and the surrounding environment had degraded and 38 respondents argued that the situation is worse. Furthermore, the study revealed that due to an increase in mining activities, 83 respondents out of 220 with higher education level had greater expectation from the increase of mining activities to improve the livelihood of their household through access to jobs and business opportunities. However, their hope faded over time, and a sense of abandonment took place.

The study showed that, since 2002, there has been an increase in the number of mining companies, but unemployment and poverty have not reduced. Access to better health care and primary education remains a challenge. "*There are no jobs and the few jobs which are available are given to those who have political or family connections in the company*" (Kolwezi street vendor, 2016). As a result, some local community members are beginning to question the government's ability to improve their living conditions based on mining activities.

Based on the fact that the majority of respondent stressed that regardless of the increase in mining activities, their lives have not improved, the study asked a furthermore question to the household to elaborate on their source of income. In answering this question study participant were asked to choose between direct employment or indirect employment to the

mining sector and others.

The results of the survey are presented in **Table 5.6** below. Direct employment includes employees who are directly employed by mining companies. Indirect employment includes the contractors and subcontractors who are working on the mine sites (construction, exploitation sites, earthworks, equipment maintenance, security and other services). Other includes the informal sector, illegal artisanal mining, street trade, and informal kiosk.

Table 5.6: the Household source of income

Source of income	**Direct employment to mine**	**Indirect employment to mine**	**Other**	**Total**
Quartier Mampala	20	9	11	40
GCM Compound K'lzi	21	8	11	40
Makomeno	11	8	11	30
Mutoshi	13	10	7	30
Ruashi	12	10	18	40
Dilala	12	12	16	40

Fieldwork data (2015 – 2016)

The results of the surveys presented in **table 5.6** above show that out the 220 respondents, 89 are directly employed by the mines, 57 works indirectly for mining companies through subcontractors, and 74 are involved in some form of informal economic activities.

Nevertheless, respondents involved in informal economic activities and self-employment recognised that as the number of mining companies operating in the Katanga Copper Belt increased, their daily incomes increased. On the other hand, respondents working directly or indirectly in the mining sector showed signs of uncertainty about their future earnings. They argue that if mines were to close permanently, it would result in a socio-economic crisis because of a lack of secondary industry.

"*... There is no government or business structure to prepare or advise mining workers for life after mines or lay-offs. They seemed to deliberately ignore this key element of the development principle. Local communities are not prepared on how to deal with the aftershocks of mine closure or retrenchment ...*" (Extract form NGO respondent in Lubumbashi, 2015). Among the concerns of residents is their inability to secure a future for

their households: "*I feel pain when I look around, and all I see is dust. Life was different when Gécamines was considered the father and mother of our community. Our needs were met with a decent life, but today, we do not have access to decent healthcare. There is no electricity and clean water. Our community is divided. Only a few people with family and political ties benefit from the exploitation of mineral resources...*" (Resident interview, 2016)

The study uncovered that the dilemma for many households is the difficulty they have in changing their perception from the role that was played by Gécamines, and the current mining scene in the Katanga Copper Belt. The reason for this situation is that the majority of respondents always use the former glory of GCM to measure the current socio-economic approach of the mining companies operating in their regions. Respondents in the age group of 50 years and above and mostly former Gécamines employees expressed these concerns. Thus, a follow-up question to the local community to provide their level of education and perception of sustainable mining practice in the Katanga Copper Belt reveals that, respondents with some form of higher education have a better understanding of sustainable development principles and environmental legislation in relations to mining activities compared to their counterparts with limited or no education.

5.5.1 Level of education and perception of environmental legislation role in the mining of the Katanga copper belt.

The Katanga Copper belt has benefited greatly from the social investment of the GCM great era, which has provided schools with basic education and health system. Nevertheless, GCM's social interventions were based on a paternalistic approach that was inspired by Katanga's colonial legacy (Rubbers, 2010). The paternalistic system of the GCM was to provide housing, health care and basic education, both primary and secondary education, to immediate family members of the company's employees, such as children. In fact, the backbone of the Katanga Copper Belt education system was built on the GCM infrastructure and human resources. Thus, the educational system of the Katanga Copper Belt was considered the best in the country. This aspect of the study is reflected by the level of training of respondents from the Gécamines Compound, Mampala, Mutoshi and Makomeno.

It is clear from the literature review that one aspect of community development in the context of sustainable mining practice is education and training to ensure that future generations have

the ability to survive even after mining activities or mine closure. Furthermore, the education system and the provision of educations facilities by mining operators become recurrent themes with study respondents. Thus, study participants were asked to determine their level of education. In answering this question, study participants were asked to choose between primary, secondary and tertiary education level. The results of the survey are presented below in **Table 5.7**.

Table 5.7: Study participant's level of education

Location	**Primary**		**Secondary**		**Tertiary**	
Gender	**Males**	**Females**	**Males**	**Females**	**Males**	**Females**
Quartier Mampala	2	8	6	9	10	5
GCM Compound K'zi	3	9	4	12	9	3
Makomeno	0	2	5	3	14	6
Mutoshi	0	1	5	6	13	5
Ruashi	4	8	7	13	5	3
Dilala	4	7	5	14	6	4
Total	13	35	32	57	57	26

Field data materials (2016)

The survey results presented in table 5.8 above showed that out of 109 women, only 26 have some form of higher education, compared to 57 out of 111 male respondents. The results showed that men interviewed in the Katanga Copper Belt have greater access to higher education than women. A follow-up question with women interviewed with only primary or secondary education to why they did not further their studies, revealed that the main reason was related to financial difficulties. In some instances, female respondents argued that priority was given to their brothers.

However, the majority of the women surveyed with low education level were not born in the Katanga Copper Belt and have no historical connection with GCM. Some of them pointed out that they had moved to the area in recent years in search of jobs or business opportunities. Although the majority of men with tertiary education were born in the Katanga Copper Belt, the study also revealed a higher number of men with higher education who are migrating to the study area in search of jobs and business opportunities. The

majority of internal migrants surveyed came from the provinces of Kasai, Kinshasa, North Kivu and South Kivu, mainly by road, rail and planes to reach the Katanga Copper Belt.

The level of education plays an important role in the perception of sustainable mining practices in relation to the economy, community, environment, safety and efficiency. Thus, Tate *et al*, (2003) argue that education is one of the key factors influencing people's perception of their environment. Therefore, the study observed that local community respondents with higher education were expected an improvement in their livelihoods through mining activities. However, their hope faded over time and a sense of abandonment took place. Hence, local residents are questioning the government's ability to efficiently implement environmental legislation and improve their lives by saying:

"*...We do not comprehend the role and responsibility of our government in the mining sector. Even though there are policies and legislation in place for better management of the environment and the community development, the environment, in general, continues to be degraded and local communities continue to live in poverty and lack of social infrastructure*". A follow-up question to the respondents with higher education to know why the local community does not express their discontent in the court of law or claim their environmental rights? Their response was that:

"*…every time we try to complain about our living conditions or the treatment of some companies or unemployment, we are threatened by those who are supposed to protect us by saying that our actions would scare investors. These people (the authorities) are so corrupt and do not care about us. In fact, government officials are absent when it is of community interest, they only appear here during election campaigns*..." (Household interviews, NGOs, street vendors, 2016).

Local community views of sustainable mining practices in the Katanga Copper Belt were also echoed by President Joseph Kabila during his address to the Katangese community in 2015 and stressed that "*the number of trucks loaded with minerals exiting the Katanga Copper Belt every day is high and does not reflect on the local community's lives*".

In addition, regardless of the respondents' level of education, they are all concerned about the current rate of environmental degradation caused by mining activities, including socio-economic infrastructure. This study revealed that respondents are concerned about the government's inability to implement environmental legislation for the sustainable

development of the local community and the protection of the quality of the environment. Thus in the next section, the study presents the observed and reported social economic impact impacts of mining activities since 2002.

5.5.2 Social economic impacts of mining activities in the Katanga copper belt

In this section, the study discusses the general perception of socio-economic impacts of mining activities in the Katanga Copper Belt in view of the environmental legislation and policies for local community development.

The study found that the first positive socio-economic impact of mining takes the form of regular payment of workers' wages. The study made an important discovery that because of regular payroll payments, small businesses are flourishing all around the study area. The regular payment of wages by mining companies and related industries has reinvigorated the activities of small businesses. It should be noted that the majority of the unemployed local community survival strategies are linked to small businesses and informal street traders.

The majority of street traders outsource their goods from neighbouring countries such as, Zambia, Angola and South Africa, which includes cross-border trading. In addition to street vendors, motorcycle taxi has been added as a local business practice for the unemployed, but also positively contributing to the affordability of local transport by low-income earners. Below **Figures 5: 2,3,4,5,6,7,8 and 9** depict the type of informal business activities that much local community/household are actively involved in to support their household.

Figure 5: 2-3: small business and street vendors in the city of Lubumbashi

Figure 5:4-5: Street traders and pedestrian in Gécamines compound of the city of Lubumbashi

Figure 5:6-7: Motorbike taxis in the Gécamines compound and Ruashi in Lubumbashi

Furthermore, the study found that for many local communities, the informal economic activities in which they are involved in are only a survival strategy in the absence of better job opportunities because many of them have tertiary qualifications. Nevertheless, for others, their survival strategies have become a lucrative activity and expressed their desire to develop themselves further in order to support their households. The study also found that low-income people buy their food on the street market, which is affordable to many households but conducted in a poor environmental condition sometimes without hygienic standards. See Figure 5.8 and 5.9 below which depict some local community market in the study area.

Figure 5.8: Street food market in the city of Kolwezi

Figure 5.9: Local street food market in the city of Kolwezi

It must be noted that most of the street food market, are conducted under poor environmental conditions which also highlights the government's inability to uphold environmental regulation compliances of certain types of economic activities.

"*The government is aware of our suffering as well as our illegal street trade practices. They cannot do anything to solve these problems as long as there is no work and durable solution to our socio-economic problems, which is why they are inactive about the illegal and unregulated practices of street trading*" (Street traders, 2015). The study found that street traders and informal trading in most cases are conducted with impunity.

The study further revealed that artisanal mining practices had become an indispensable

source of income for the unemployed local community and a business venture for young entrepreneurs. However, this phenomenon is beginning to be regulated by the DRC government as a means of empowering the financially disadvantaged local communities and creating a middle-class society. Although this practice has contributed positively to the financial sustenance of households, it has caused family upheavals by attracting minors and women with easy money. Artisanal mining is one of the primary causes of adverse environmental impacts because of the lack of monitoring and evaluation. Although this practice has somehow decreased due to formal mining companies taking over mine sites and quarries, some respondents with a low level of education have pointed out that:

"*Because of the parents' inability to pay the children's school fees and provide them with food...the only option available for children is to work in the illegal mines as diggers, to generate income to support their families. I started working in artisanal mining when I was 15 years old...nobody forced me to do that, but I had followed my friends who were there before me*" (Artisanal mining worker, 2016).

Another important socio-economic element which the study observed that comeback as a positive outcome from respondents and which across the study participant in the development of small scale agriculture for food security purposes and an economic resilience strategy. When asked why small farming activities have been on the rise in the Katanga Copper Belt, respondents point out to the past bad experience when mines closed down and local community could not afford food to sustain their household. One particular resident of the city of Kolwezi stressed that: "… *an employee of Gecamines, the company used to provides us with all the necessary food, educations for our kids and medical care. However, due to lack of production, the company collapse and stopped providing with all we need to survive…and the situation was very bad until the new mining company took over. Therefore, local community do not want to find themselves in the same situation as before, hence they engaged in farming activities for sustenance purpose"* (Extract of an interview with Kolwezi resident, 2016). In addition, another respondent argues that:"…*most of the staple food (corn, meat, fresh fish etc) that we consume in the region comes from abroad and neighbouring countries. Hence, for me, it shows that there is a big consumption market which I can contribute with a small production of corn for a start*". (Extract of an interview with Lubumbashi, 2016). An example of small scale farming produce is shown in **Figure 9** below.

Figure 5.10: Lubumbashi local resident farming harvest and the researcher in the city of Lubumbashi

The owner of the farming harvest shown in **figure 5.10** pointed out the fact that part of the crop is destined for household consumption and the surplus is sold on the local market for additional household needs. The relevance of small- scale mining activities in the study area is that it helps progressively to attenuate the unemployment and food shortage.

Another observation made by the study is the development and rehabilitation of socio-economic infrastructure resulting from increased mining activities in the study area. The study discovered that the government represented by GCM signed a US$9 billion agreement with two Chinese construction companies in September 2007. The Chinese and Congolese agreement is to finance the construction and rehabilitation of roads, railways, hospitals, schools, electrical power and water dams, in exchange for ten million tonnes of copper and hundreds of thousands of tonnes of cobalt (Global Control, 2011). Based on this arrangement, some essential roads in the Katanga Copper Belt have been rehabilitated. The Kassumbalessa road connects the city of Lubumbashi to the Kasumbalessa border post with Zambia and the National Road Number 1, links also the city of Lubumbashi to the city of Kolwezi. These two transport routes are strategic for the socio-economic development of the Katanga Copper Belt. The rehabilitation of the main road infrastructure in the Katanga

Copper Belt has contributed to the connection of cities and businesses. This is seen as a positive contribution to the socio-economic life of the study area. In addition, in order to connect the Katanga Copper Belt to external and internal commercial centres, the municipal primary and secondary roads are also undergoing rehabilitation. **Figure 5.11** below shows one of the main avenues rehabilitated in the city of Lubumbashi quartier Makomeno.

Figure 5.11: Rehabilitated Avenue Likasi in quartier Makomeno Lubumbashi

Furthermore, some mining companies have been rehabilitating some of the state power generation dams in order to generate electricity for their activities. However, surplus power is distributed to the local households in the neighbouring communities. Nevertheless, the electricity supply is still a challenge and limited to some parts of the study areas, such as in areas where middle to high-income earners live.

"*...The rehabilitation of socio-economic infrastructure seemed to be concentrated in selected areas which are useful to mining activities and residential areas where political figures reside. It has been years since we had a permanent water base and electricity in our area. We have the impression of been abandoned by our government, and the mining companies are not doing enough to compensate our community for the use of our natural resources…"* (Rwashi resident's interview, 2016)

These views were also echoed by an NGO officer operating in Kolwezi who stressed that: *"...Even though the number of mining companies has increased as well as small businesses in the study areas, we are concerned about the type of employment created for*

local communities and the short-term contracts we are offered. Key position and well-remunerated positions are occupied by an expatriate" (Local NGO operating in Kolwezi, 2016).

Regarding social infrastructure development such as hospitals and schools, the study found that most of the social infrastructures were built during the former glory of GCM and these form part of the backbone of Katanga's health and leisure system. However, the majority of them are in a state of decay and lack of equipment and medication. Furthermore, most qualified medical personnel have left or spent much of their time in private clinics. Similarly, public schools, in addition to those that have been rehabilitated, are also characterised by a lack of maintenance and qualified personnel.

Furthermore, the study found a slight shift in the local community's away from depending on mining activities as stressed by about 86 respondent in the city of Lubumbashi and 52 in the city of Kolwezi that: "… *Even though mining activities have increased, due to recurrent uncertainty surrounding jobs in the mining sector, we have started to look elsewhere to generate and improve household income through small farming, and street trading*" (Kolwezi residents, 2016).

There are many socio-economic impacts of mining activities in the Katanga Copper Belt, however, the study has identified a limited number of positive and negative socio-economic impacts, but the most notable can be classified as illustrated in **table5.8** below,

Table 5.8: Summary of identified socio-economic impacts and challenges of mining activities in the Katanga copper belt

Socio-economic impacts of mining in the Katanga Copper Belt in 2002 and 2015
Socio-economic infrastructure - Limited access to education from disadvantaged local communities - Limited health care services - The nation-existence of sanitation services in local communities - Poor water and electricity supply system - Poor quality of transport infrastructure, such as roads and railways
Access to economic opportunities - Limited access to employment - Limited access to start up financial systems

Socio-economic resilience strategies

- Small-scale farming activities
- Informal economy
- Street trading
- Private transport
- Backyard room rentals
- Informal Kiosk
- Illegal mining

The data as presented in Table 5.9 above were compiled based on personal views expressed by the entire study participant and personal note made by the researcher during fieldwork based on personal observations. However, it must be noted that this list is not comprehensive due to the limited time we had to investigate thoroughly these issues. Thus in the next section the study report on the environmental impacts (water and soil contamination) caused by unregulated mining activities in the Katanga Copper Belt

5.5.3 Environmental impact of mining activities in the Katanga copper belt

In this section, the study presents some negative environmental impacts of mining activities observed during empirical studies as well as those reported by local community members.

The negative impacts of mining on the natural environment can affect food security, health and livelihoods. As a result, the most vulnerable to the degradation of the mining environment are those with minimal resources to minimise the negative impacts of mining activities on their environment (Weber-far *et al.,* 2001). The results of the study reveal that a large part of the population in the Katanga Copper Belt is exposed to negative consequences of mining activities. This population consists mainly of poor communities, and this is due to their geographical location with mining operations. Therefore, the study's approach in this regard was to establish the leading cause of environmental degradation in the Katanga Copper Belt.

The respondents of the study were asked to identify the main cause of environmental degradation in the study area. In answering this question, the respondent was asked to choose between local authority attitude, people's behaviour, mining-related activities and others. The information's collected on this issue are presented in **Table 5.9.**

Table 5.9: Main causes of environmental degradation in the Katanga Copper Belt

Cause	Authorities	People	Mining-related activities	Other
Quartier Mampala	12	9	12	7
Kolwezi GCM compound	11	9	16	4
Makomeno	8	7	10	5
Mutoshi	7	7	12	4
Ruashi	14	9	16	1
Dilala	15	11	9	5
Total	**67**	**52**	**75**	**26**

Fieldwork material (2016)

The study found that 75 out of 220 respondents point out to mining activities as the main cause of environmental degradation. However, 67 out of 220 respondents argued that their natural environment is deteriorating because of the inability of the authority to uphold environmental legislation for the sustainable management of the environment. 52 respondents out of 220 indicated that people's behaviour is also one of the causes of environmental degradation. Local community member stressed that: "*mining companies especially those owned by Chinese and Indians are operating in total disregard of environmental quality …because sometimes they discharged minerals waste in water stream or open land field without been punished* "(Rwashi resident of the city of Lubumbashi, 2016).

Furthermore, the study found that community leaders are also concerned about the approach of mining companies towards environmental management, including socio-economic development. "*In most cases, we are not consulted but we are asked to sit on the table after everything has already been decided, so we are powerless and do not have a say in what is happening in the community and the surrounding environment*"(Local community leader, 2016).

During fieldwork, it was noted that the civil society and local community members are concerned about the rate of environmental degradation caused by mining activities and the government's inability to uphold the environmental legislation. Surprisingly, mining companies and in most cases international and multinational companies are adopting a much more favourable stance towards sustainable environmental management. However, local communities point out to artisanal and small-scale mining, which are usually the leading

cause of environmental degradation as well as the government's official systems to regulate and prevent environmental degradation. This is not functioning correctly because of corruption and a lack of qualified human resources.

Furthermore, the study found that government officials do not follow up on submitted EIAs and EMPs. "…*In most cases, government institutions do not act or follow up on the environmental report made by mining companies to see if it is done following the legislation…It seems that these plans are only done for procedural purposes so as to obtain a social license to operate*" (NGO representative in Lubumbashi, 2016).

Furthermore, Banza (2000) stressed that in the city of Lubumbashi, the local community for a long time complained about air pollution caused by mining activities. According to Banza (2000) due to air and water contamination in the study area, some resident of the Katanga Copper Belt has developed the respiratory and metabolic disorder, burning sensation in the eyes and throat, and tumours. The study established a correlation between Banza (2000) assertion and complaint expressed by the study respondents during fieldwork. Therefore, it was important for the study to investigate further cumulative effects of environmental degradation of mining activities in the Katanga Copper Belt.

Weber *et al.* (2001) stated that the most vulnerable to environmental degradation of mining activities are those with limited resources to minimise the negative impacts of mining activities in their environment. Hence, the empirical results show that a long history of intensive mining activities conducted in the study area with less environmental legislation consideration has led to severe environmental degradation and that most of the complaints related to environmental contamination come from low-income areas. In Rwashi, household respondents pointed out the contamination of Navindu stream around Rwashi mining operations. Another contaminated stream is Kabesha in Kampemba around Congo Dong Fang Mining International (CDM)

A follow-up question to the local community about what mechanisms exist for reporting environmental degradation caused by mining activities was asked. The majority stressed that there are none, but in most cases, only NGOs are most active in exposing companies and people responsible for environmental degradation. Among the current environmental degradation cases known to the public are:

- Air pollution: the regular release of toxic gas by the mining operator;

In October 2010, local community groups in Luano District, Ruashi, accused a mining company operating in their area of releasing unknown toxic gas into the air that forced the local community to stay indoors or wear masks. Local community leaders pointed out that "*the community has filed a formal complaint with the local authority, but nothing has been done to address this recurring problem. A member of the provincial government went to visit the Rwashi mine, but until today, no concrete action or offenders have been brought to justice*" (Rwashi resident, 2015).

- Contamination of water streams by overflowing sulphuric acid from the transport tracks;

Action Contre l'Impunite Pour Les Droit Humains (ACIDH), an NGO operating in the Katanga Copper belt, regularly complains about regular spills of liquid mining waste, known as acidified wastewater, into the streams around Belair and Rwashi area. "The wastewater and acidified water in these areas have affected some wells used for watering agricultural products in the community" (ACIDH, 2012);

- Loss of agricultural land and vegetation

In 2015, about 45 hectares of arable land was destroyed in the village of Mukola in Kolwezi. The villagers accused Mutant mining of spilling mineral waste in and around their fields. Unlike the previous case, the local authorities of the Environmental Department confirmed this case.

The Mukala village chief pointed out that a vast area of fields is destroyed and that it will take years to restore it. When working in this area, all floras have become black, and the ground is covered with a white substance. A national radio station reported on this subject on 1 July 2015, noting that "during this time the majority of the local community coughed and did not take care of their daily activities on the ground". In addition, the village chief pointed out that the Kando River, which is a source of water, had also been polluted by these recurring incidents (Chief Muloka, Kolwezi, 2015). The practice of uncontrolled mining waste discharged into the environment is shown in **Figure 5.11** which depicts a satellite view of direct discharge of acidic wastewater into the watercourse and wetlands near a primary water reservoir in Kilima Simba, 20 km from the city of Lubumbashi.

Figure 5.11: Satellite view of mining waste discharged into the natural environment (Google earth, 2017)

Another discovery made by the study is that of land management and land use system affect the effectiveness of environmental legislation in some part of the study area. Accordingly, based on the land management system traditional leaders have power over their land. Hence, in recent years some protected land has been allocated to mining activities without proper consultation between all spheres of government involvement in the administration of environmental legislation and environmental management (NGO representative interview, 2016). In some cases, traditional chiefs have the right to redistribute land regardless of the type of mining taking place or wildlife on the land. In addition, the study area lacks a clear strategy protecting certain areas and a land use system to determine land reserves for agricultural activities and industrial activities. Although this separation exists in some study areas, government officials do not have the necessary training to apply the concept of land and land management to protect the well-being of the local community. As a result, mining activities, mainly small-scale mining, artisanal mining and illegal mining, have caused damages to the ecosystem and human health. Therefore, because severe environmental degradation can lead to cumulative effects, the study embarked on identifying the cumulative effects of environmental degradation in the Katanga Copper Belt resulting from mining activities. Thus, a question was asked to government officials, NGOs and critical departments involved in environmental management to provide their views on cumulative effects. The cumulative effects of environmental degradation caused by mining activities in the Katanga Copper Belt are of

different types, but the study focused only on socio-economic cumulative effects.

It is important to note that the majority of the local communities depend on natural resources for their livelihoods. This includes food, in terms of vegetation, and wood for construction and fire. Residents also engage in gardening, small-scale agriculture, and urban agriculture. Thus, the identification of the cumulative effects of mining activities in the Katanga Copper Belt was based on the participatory direct observation approach, principal respondents' views and Eccles *et al*. (1994) analysis of the cumulative effects of human activities on the natural environment.

The study discovered that, before the rise of current mining activities in the study area, local communities could practice urban agriculture in their neighbourhoods. However, since the increase in mining activities, especially small-scale mining, the quality and quantity of their agricultural production have decreased considerably. The local community complained that now they have to travel a long distance to find good arable land and water resources. The consequence of this situation on the livelihoods of the local community is in the increase in transportation and irrigation costs. The quality of rivers and streams around the study area that use to be a source of good quality of fish for many household and economic activity, has deteriorated. The negative effects of mining activities on the environment can be seen in the quality of the fish that come from streams around the city of Kolwezi and Lualaba River see **Figure 5.1** below. One respondent in the local community of the city of Kolwezi stressed that: "*for some reason, we have observed a decrease in the quality and quantity of fish since early 2000 from the Lualaba River*". Even though no study has been conducted to establish the links between the poor quality of fish and mining activities, local communities believe that is it due to mining waste which is dumped in or around the Lualaba River.

Figure 5.12: Fish from Lualaba River sold on the local market of the city of Kolwezi

From an economic point of view, the environmental degradation caused by the mining activities has led to a loss of income and economic activities in terms of agriculture and fishery.

The study uncovered that due to unregulated small-scale mining and illegal mining practice, local families in poor communities have suffered the most as has been pointed out by one member of the community "…*I was running a small family farm that produces maize, beans and sweet but since the increase of mining activity, I have noticed that the quality of the land has deteriorated because of the mining and acid wastes that are dumped into the neighbouring areas, we have complained but no one is listening to us*" (Kolwezi resident interview, 2016).

Hence, based on Aucamp (2009) analysis on cumulative effect of environmental degradation, the study conducted in the Katanga Copper Belt has identified through report from study participant, observation and desk-top research a number of environmental cumulative effects resulting from negative impacts of mining activities in the study area. The results of identified cumulative effect are presented below in **table 5.11**.

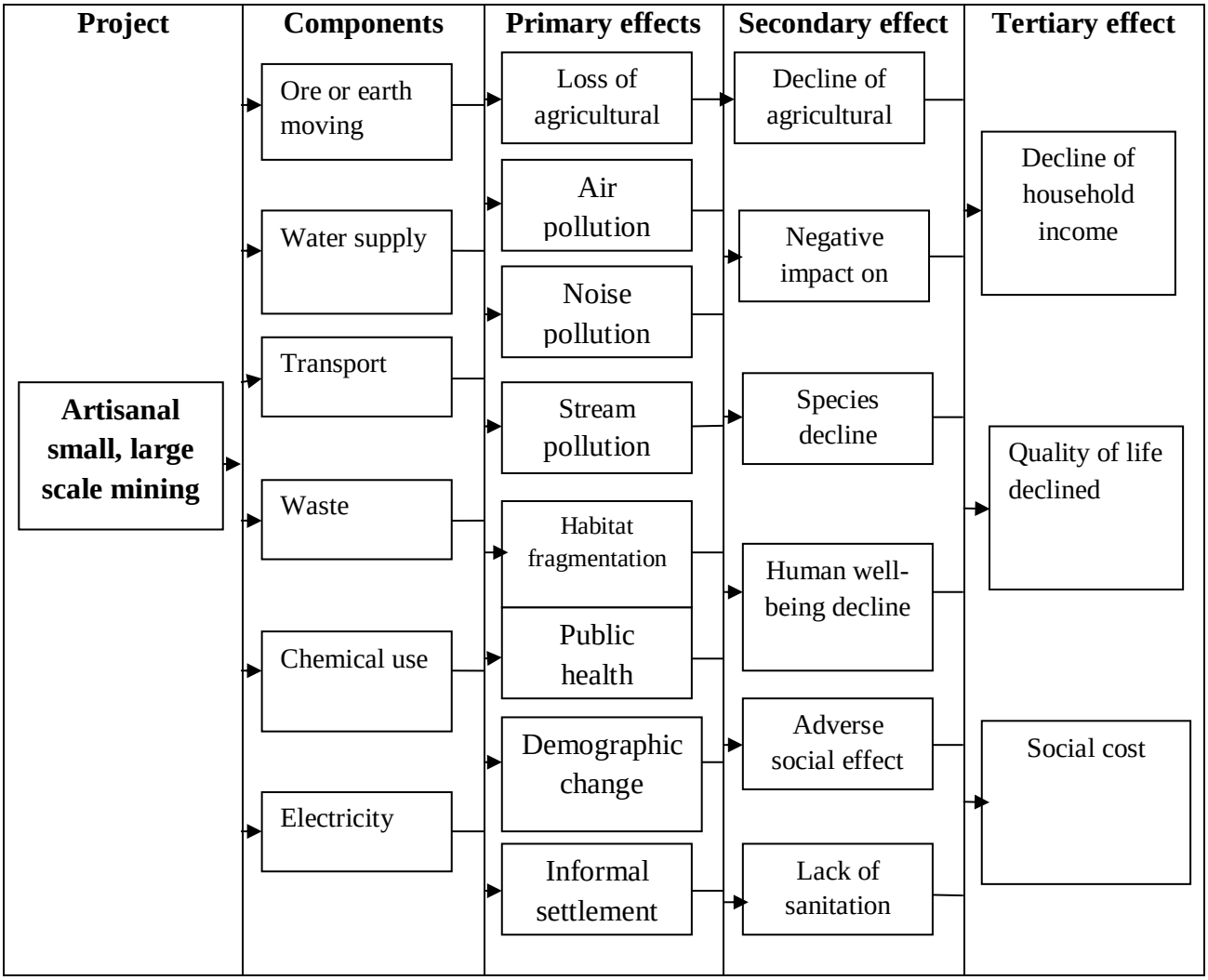


Table 5.11: Summarised identified environmental cumulative effect of negatives impacts of mining activities in the Katanga Copper Belt.

Data presented in table 5.11 are not exhaustive but represent the general views of the study respondent is that the government failed to uphold efficiently the environmental legislation in the mining activities of the Katanga Copper Belt. Thus the next section delves into the analyses and presentation of challenges (Corruption, lack of qualified human resources, people education and attitude) hindering the better and efficient application of environmental legislation for the promotion of sustainable mining in the Katanga Copper Belt.

5.6 Challenges affecting EL implementation, monitoring, and evaluation and stakeholder's engagement in the mining sector of the Katanga copper belt

Interviews conducted with mining representatives, government officials and NGOs reveal that environmental legislation is essential for the promotion of sustainable mining practices

in the Katanga Copper Belt. Nevertheless, there are challenges in the administration of environmental legislation which affect the promotion of sustainable mining practices. Official respondents were asked to highlight challenges that exist in the administration of environmental legislation and how these could be improved. The results of the study in relation to challenges affecting the administration of environmental legislation for the promotion of sustainable mining in the Katanga Copper Belt are presented in the following subsections.

5.6.1 Government institutions and officials: Lack of qualified/skilled human resources and motivations

The study discovered some degree of amateurism within and between government institutions in the administration of environmental legislation in the mining sector. It is important to note that achieving sustainable environmental management and community development through mining activities requires strict technical knowledge and education. The level of environmental disasters in some parts of the mining areas of the Katanga Copper Belt reflects poor-quality control and compliance with environmental legislation during the EIA submission process. However, it also reveals the lack of qualified government officials and the lack of institutional collaboration to identify weaknesses in submitted reports by mining companies. For example, when asked about the individual qualifications of the officials involved in the monitoring and evaluation of the environmental legislation application, very few officials have received environmental training, but most have qualifications in political science, law, and economics. These include few geographers and ecologists who control critical responsibilities in the Department of Environmental and Sustainable Development Mining. This trend was observed in the various government institutions except for the Department of Justice, where the majority of the officials have some form of legal training but limited knowledge of the application of the concept of sustainable development in mining development projects.

These observations raised the question of how unskilled government officials could occupy positions requiring extensive training in environmental management and sustainable development. In an attempt to answer this question, a government official argues that: "*because of unemployment, available jobs are not awarded from merit and qualification but on recommendations based on political affiliation and family ties. Nowadays, it is about whom you know in the government institution to get a job and not your qualifications*"

(Official from the Ministry of Mines, 2016). As a result, the amateurism of government officials is reflected in the quality of monitoring and evaluation. More disturbing is the fact that, given the place of the mining sector in the development of the Katanga Copper Belt, particular attention would be given to skills training. However, respondents from the National Division of Environmental Affairs pointed out that "there is no budget allocated to finance the formal training or assessment of governments officials" However, it is important to note that among these staff members, some are really dedicated to providing excellent quality services with the help of NGOs which are active in the mining sector.

Without disrespecting the men and women who perform an incredible number of daily tasks while trying to uphold the environmental legislation in the mining sector, it is important to note that the quality of work produced by the two leading government institutions involved in the implementation of environmental legislation in the mining sector appears to be affected by the lack of qualified human resources. In addition, the study revealed a significant shortage of qualified environmental practitioners in the various government institutions involved in the administration of environmental legislation in the mining sector of the Katanga Copper Belt and that those with qualifications are underpaid. NGO representatives pointed out the fact that: "*one of the things that contribute to the weak application of environmental legislation in the mining sector is the lack of motivation of government authorities*". Furthermore, "*the manner in which the state government treats those responsible for the enforcement, control and monitoring of environmental legislation in mining affects the quality of the delivery of environmental services in the mining industry*" (Government officials, 2016)

5.6.2 Corruption and lack of transparency

The study followed up on the lead given by some key mining stakeholders about some mining revenues not reaching the government coffers. One of the significant challenges identified by the empirical study is a recurrent complaint by NGOs and local communities about the rampant corruptions in the mining sector that has affected the sustainable management of the environment. The study of the Katanga Copper Belt revealed that mining revenues are generated through different sources linked to mining activities, namely, taxation, royalties, signatory bonuses and the sale of public mining assets in private mining companies. Profits made through Gécamines transactions are paid directly in three different state agencies, which include the treasures Direction General Des Recette Administrative

(DGRAD), Direction Generale des Import (DGI) and Gécamines. However, the researcher had difficulty establishing whether the value of the mining assets sold by Gécamines on behalf of the state was approved correctly. As well as some difficulty in understanding how payments are made into Gécamines treasuries in order to support operational community development including environmental management. Nevertheless, one official from Gécamines stressed that: "*Even though royalties are paid officially into Gécamines, most of it goes to the government thus leaving nothing in the company's coffer for development projects and payment of wages*" (Mining officials, 2016). Also, "*there is a corrupt governance practice that allows some civil servants to directly access Gécamines mining revenues without following the established government process*" (Extract from interview with NGOs, 2016). As a result, a significant portion of mining revenues does not reach public treasuries to finance community development projects.

In the absence of concrete evidence of equitable redistribution of mining revenues in the Katanga Copper Belt, the study looks back at socio-economic indicators such as road construction, hospitals, schools, water, sanitation and electricity. This assessment approach was conducted based on literature extracted from Asare *et al.* (2001) and Azapagic *et al.* (2011) which argues that any geographical location experiencing increased mining activities should benefit from mining revenues. Therefore, under normal circumstances, the government must engage in socio-economic infrastructure development projects in mining communities using mining revenues to improve the welfare of local communities. However, empirical evidence shows that irrespective of the increase in mining activity in the Katanga Copper Belt, the region lacks adequate sustainable socio-economic infrastructure such as roads, water and electricity supply as well as limited access to health care. It is also a concern that the government has not tackled local community complaints about mining jobs. The study observed that in mining companies where Chinese are majority shareholders, a good number of positions are in the hands of Chinese nationals. Based on interviews with government officials and local community surveys, the study found that there is flagrant discrimination in terms of employment between expatriate and local communities as well as in terms of remunerations.

5.6.3 Lack of leadership, weak institutional communication and collaboration

The analysis of legislation and policies including interviews with mining stakeholders

revealed that the administration of environmental legislation requires the involvement of different government institutions such as the Department of Environmental Affairs and Sustainable Development, the Department of Justice, the Department of Mines and the Department of Agriculture and Forestry. However, sometimes and in the case of the Katanga Copper Belt, institutional relations and cooperation have resulted in a conflict of interest due to a lack of communication and collaboration. The study reveals that the leading cause of the conflict between the different government institutions and its officials who are involved in environmental legislation administration in the mining sector is related to the collection of environmental taxes, monitoring and evaluation as well as environmental legislation compliance. These represent a source of personal gain for some officials.

Some institutional conflicts are found in the ambiguities raised by the legislation of policies. In some instances, there is no apparent organisation and definition of the roles of each government institution involved in the management of environmental mining. For example, according to the Environmental Legislation framework of 2011 and the Mining Code of 2002, the Provincial Department of Environmental Affairs and Sustainable Development and the Provincial Division of Mines have the administrative responsibility to apply the environmental legislation in the mining sector for the promotion of the sustainable mining practices as well as local community development. However, the law does not clarify the separation of the administrative responsibility of each government institution. In an ideal institutional working relationship, the Ministry of Mines should focus on developing policies and strategies for the development of the mining sector. Moreover, the environment department as a technical institution should focus more on the application of environmental legislation in the mining sector. The two departments should complement each other for better application of environmental legislation and the promotion of sustainable mining rather than being in conflict with each other.

Furthermore, the study revealed that one of the sources of conflict between the two government institutions is related to the administrative procedure for the approval of EIAs submitted by mining companies as required by environmental legislation and a fee which must be paid for the process. According to the Mining Code of 2002 and the Mining Rules of 2003, EIAs report must be submitted to the Mining Department, which in turn involve the Ministry of Environmental Affairs and Sustainable Development for technical compliance and suggestion before approval by the department of mining. However, the

Mining Code of 2002 neither the Environmental Law of 2011did not make provisions for the collaboration of the government department in terms of EIAs approval process. According to Article 16 of the Mining Code of 2002, the definition of the principle of Restriction of Proficiency is the source of confusion. It contained that, "*environmental services within the Ministry of Mines have the capacity to assess the EIA with or without the administrative participation of the Department of Environmental Affairs and Sustainable Development which is the national guardian and custodian of the country's environment*". The formulation of legislation leaves government institutions and officials to interpret the law for their own benefice (corruption). Therefore, in many cases, the Department of Mines without the knowledge and involvement of the Department of Environmental Affairs and Sustainable Development approves EIAs, because it involves the collection of taxes and fees that some officials use for their gain. The source of many conflicts between the Ministry of Environmental Affairs and the Ministry of Mines is "*the required administrative fees to be paid by mining companies for the approval of EIAs, which officials and institutions want to control*" (Environmental Division interviews, 2016). Conflicts of duties and responsibilities between the two government institutions jeopardise the actions of government officials, in relation to monitoring and evaluation of environmental legislation in the mining sector of the Katanga Copper Belt. More disturbing is the fact that: "*Some mining companies are now denying access to officials from both institutions because the same process cannot be conducted twice"* (Mining official, 2015). For this reason, some unscrupulous mining operators exploit this weakness to their advantage with the help of some lawyers to avoid certain taxes such as deforestation tax, which is required by the Mining Code and the fundamental Environmental Law.

5.6.4 Poor community participation and public debate

According to Hilson and Murck (2000), one of the conditions for reaching sustainable mining practices is to involve all stakeholders in the decision-making process, including the local communities. In addition, Article 69 of the Mining Code of 2002 indicates that all future mining projects must submit an integrated development plan which includes views from local communities before the commencement of mining. Hence, mining companies and local authorities have the obligation to inform the communities about the positive and negative impacts of their activities on the environment as well as on human health. This process opens up the possibility of a public debate with the local communities. Furthermore, Sections 124 and 127 of the Mining Rule of 2003 emphasise community participation

during the EIA process. However, the local community interviews revealed a quasi-absence of public debate and community participation in the planning process of mining projects and the EIA process. Comments extracted from interviews with community members revealed that in most cases, community members living in close proximity of mining operations will only notice earth-moving equipment and realise that a mining operation is about to start. A community member in Kolwezi stressed that "due to corruption in our society, most of the time community leaders are invited to meet with authorities and mining companies, which at a later stage is presented as community participation". Community participation in the decision-making process of environmental management seems to be a farfetched reality for many local communities. In the case where community members were consulted, their views are not reflected in the final documents submitted to the authorities and the final documents are not presented to the community for further engagement.

5.6 Chapter Conclusion

The study of the role of environmental legislation for the promotion of sustainable mining in the Katanga Copper Belt revealed that environmental legislation can play a crucial role in promoting sustainable mining and sustainable development of local communities if well applied. In this chapter, it was demonstrated that since 2002, the laws of the DRC introduced and captured the concept of sustainable development for the management of the environment. The needs for enacting legislation were to establish a legal framework within which mining operations should be conducted in order to achieve sustainable mining. Nevertheless, the study shows that even though different legislations applicable to mining include the concept of sustainable development, the majority of the local population still live in poverty and the environment continues to be degraded by mining activities.

In this chapter, the study showed that one of the challenges affecting the better administration of environmental legislation in the Katanga Copper Belt is conflicts, which arise from the practical interpretation of the law and lack of human capacities. The study has discovered that the environmental legislation and mining legislation have allocated the same duties to different government entities without clear separation of power. Therefore, mining companies occasionally have to deal with more than one government official from a different government department. Furthermore, mining officials complained about some government official's corrupt attitude, which negatively reflects on the efficiency of

the application of environmental legislation in the mining sector. Mining officials stressed that in many cases, government officials conduct monitoring of environmental legislation compliances for personal enrichment interest rather than for the protection of the quality of the environment.

The implementation of environmental legislation requires not only legislation but also technical knowledge from government officials in order to be more efficient. Nevertheless, the study revealed worrisome lack of qualified government officials in the principal divisions involved in the administration of the environmental legislation. Furthermore, the study uncovered a severe lack of communication and collaboration among stakeholders for the better administration of environmental legislation in the mining sector. For example, local communities complain that in most cases the EIA process takes place behind closed doors without real involvement of local communities.

Thus, the study concludes that there is a governance gap in the mining sector of the Katanga Copper Belt, which must be filled with a better and more efficient application of environmental legislation with the participation of all mining stakeholders.

CHAPTER SIX

ANALYSIS AND DISCUSSION

6.1 introductions

This chapter brings together Chapters 2, 3, 4 and 5 in an articulated analysis and discussion of factors identified during an empirical study by both professional and local communities on the implementation of environmental legislation for the promotion of sustainable mining in the Katanga Copper Belt and its effects on environmental management and community development.

This chapter addresses the study aims and objectives outlined in Chapter 1. The primary objective of the study was to investigate and established whether environmental legislation can influence sustainable practice and thinking within the mining sector of the DRC. Thus, the study had to identify ways in which environmental legislation can promote sustainable mining practice in ways that contribute to environmental stewardship and sustainable development of the local community. Based on the objectives of the study, this chapter is divided into 5 sections. The first section discusses the environmental stewardship of mining stakeholders in the implementation of environmental legislation in promoting sustainable mining. The second section discusses the sustainable mining practice in relation to promoting the well-being of the local community. The third section discussed the stakeholder's engagement, collaboration and participation in the implementation process of environmental legislation for the promotion of sustainable mining. The fourth section is devoted to identifying legal system and framework to improve mining stakeholder's environmental legislation compliance in the Katanga Copper Belt. The last section discusses the general implication of the study interventions.

6.2 The role of environmental legislation in promoting sustainable mining: environmental stewardship

Mayda (1985) argues that environmental legislation is useful for resource management, environmental management and economic development. However, the government must pay attention to the formulation and application approach in order to effectively contribute

to sustainable development. Furthermore, McGarity (2004) emphasised that the role of environmental legislation should be to protect and enhance the promotion of human environmental rights. Therefore, for environmental legislation to achieve its objective, it is entrusted to the administrative and judicial organs of the country (Bintu, 2010). Hence, it can be concluded that environmental legislation is an essential tool which if used effectively can contribute to the promotion of sustainable mining practice through the protection of the environment, resource management, community development, and the safety of operations (Mclellan *et al*., 2009).

The review of literature in chapter 2 demonstrates the importance of environmental legislation in the protection of the environment against mining activities and the promotion of living conditions of the surrounding populations. This means that a country with a vocation for mining activities will have put a particular emphasis on the design of environmental legislation for the protection of the environment one hand on, and on the other hand, put in place institutions capable of implementing and enforcing the legislation to promote the practice of sustainable mining. This is a critical element that help fosters a balance between economic, social and environmental development (Kokko *et al*., 2014). But, in order to properly promote the practice of sustainable mining, the state institutions have an important role to play that include implementation, monitoring and evaluation. For this reason, Bouthilier *et al*., (2012) conclude that 'effective enforcement of environmental legislation ensures the survival of the present generation as well as the future.

For reasons listed above, the Democratic Republic of Congo has since the beginning of the year 2002 set up legislation to protect nature against harmful mining activities but also to promote the well-being of local communities. The keys environmental legislation applicable to mining are articles 9, 10 and 21 of Act No 007/2002 of July 11, 2002, bearing the mining code. Articles 53 to 58 of the Constitution of the Republic of 23 February 2006; Article 9, 10 and 21 of Act No. 11/009 of 9 July 2011with environmental laws; Forest Code Law of 011-2002 of 29 August 2002; and the Law of Nature Conservation Law No. 14-003 of 1 February 2014. The particularity of this legislation is that they have captured the concept of sustainable development in order to protect the environment and promote community development.

Although the DRC has put in place environmental legislation to promote sustainable mining practice, the results obtained during the empirical study show that in the last 10 years, nature has been degraded at an alarming speed and local communities continue to live in poverty.

The situation of the local population has not improved from the economic and social point of view with the exception of a small privileged group with a political or family connection to mine manager. The survey conducted in the Katanga Copper Belt showed that mining activities, in general, are conducted with very little regard for the protection of the environment. Examples of environmental contaminations in the region are manifold and are acid spills in water stream and surrounding areas of the Kafubu and Tshiamilemba water streams in the city of Lubumbashi. Furthermore, the study uncovers that almost 63 per cent of the respondent in the city of Lubumbashi complained about itchy eyes caused smelters the other mining processing plant. This is proofs that the authorities have failed to implement environmental legislation for the protection of the environment and community sustainable development.

In answering this question, Ruppel *et al*., (2012) argue that the greatest difficulty preventing environmental legislation from producing results is linked to weak institutional structures. In the case of the Katanga Copper Belt, the centralization of power in Kinshasa, lack of qualified human resources and poor collaboration and communication affect the process of environmental legislation implementation. This view is also similar to what was expressed by study participants who decried the lack of qualified government officials and professionalism in the way in which the institutions of the state and its agents act for the protection of the environment and the well-being of local communities. The mining operators, in particular, argue that *"sometime the authorities send in two different teams from two different departments for the same evaluation and procedure ... this situation and practice is the source of confusion and poor implementation process of environmental legislation*". Nevertheless, some officials who requested anonymity and NGO representatives regretted the fact that, some well-established mining companies in the region do not give access to their facility for inspection as recommended by the legislation for evaluation and monitoring of their environmental management plan. But, government officials on their part complained about the fact that their jobs are made difficult by politicians' interference in the evaluation process of environmental legislation application. The complaint made by government officials lead to further investigation of the system in place for environmental legislation implementation for the protection of the environment and the promotion of the welfare of local communities.

The analysis of the environmental legislation contained in the mining code of 2002; the mining regulations of 2003; the constitution of the DRC of 2006 as well as the environmental law of 2011 and the forest law of 2014 informs us that; the DRC obliges the mining operators or owner of a mining right to submit to the competent authority, their environmental impact assessment and their environmental management plan in accordance with article 1 paragraph 19 of the Mining Code of 2002, Article 1,2,3,4 of the 2003 Mining Regulations and Article 21 of the 2011 Environmental Law. These provisions are supplemented by special arrangements between the Congolese government and the mining operators for the socio-economic development of the population. Based on these legislations, the state government reserves the right to verify first the legality and conformity of the EIAs and thereafter the beginning of the mining operations monitor the execution of the EMPs. This implies gaining access to mining facilities. These policies arrangements are expressed in the mining contract in the form of the obligations made to the mining operators to respect the laws of the country as well as the development of local community development plan. In addition, the mining contract also includes an arrangement between the company and the state for community development. Therefore, it can be concluded that, the DRC legislation and practice of the Congolese mining sector to include in mining contract reminders to companies to respect the environment and develop the community constitute the bedrock of the development model adopted by the Congolese government in the mining sector.

However, it seemed as though the same legislation which was supposed to be used for better of the environment and community is used for personal gain by corrupt officials and politicians. Furthermore, the legislation is silent on the involvement of other state entities in the implementation process of environmental legislation in the mining sector. Basically, the law does not delimit the responsibilities of each other in the services of the state, but others use it to enrich themselves. A mining representative stressed that, some Politian's and government officials are given money to ensure their protection in case of environmental control or to cover their failure to implement the EMPs. Thus, in the next section, the study discussed the capacities, competence and integrity of government officials in their process of implementing environmental legislation in the mining sector.

6.2.1 Government capacity to implement environmental legislation in the mining sector for the protection of the environment

McGarity (2004) and Mayda (1985) tell us that the effectiveness of well-designed environmental legislation to some extent depends very much on how it applies on the ground. This means that those in charge of the implementation must be well trained and experienced to uphold the legislation for the protection of the environment and promote the well-being of local communities. Thus, the Oxford Policy Research Paper (2013) on the impacts of mining in the DRC concludes that government officials in charge of the mining sector need the necessary skills and training to promote sustainable mining practice.

Indeed, the reform of mining and environmental legislation that took place in the Democratic Republic of Congo was sanctioned by the promulgation of the mining code of 2002; the mining regulation of 2003 and the environmental law of 2011 and forest in 2014. The particularity of these legislative reforms is the introduction of the concept of sustainable development. From this point of view it would not be an exaggeration to think that, the introduction of a new law and a concept should be preceded or immediately followed by training officials in charge for its implementation and sensibilisation of all mining stakeholders including population on environmental legislation changes (Bannes-Dabban, 2018 and Mauch *et al*., 2003). The major innovation of the environmental legislation reforms was the introduction of the concept of an environmental assessment study prior to any mining activity and an environmental management plan (article 1, paragraph 19, of the Mining Code of 2002, article 1, 2, 3.4 of the 2003 Mining Regulations and Article 21 of the 2011 Environmental Act). In particular, the environmental impact study should analyse impacts on water, air, and soil quality as well as the impacts on human life of the surrounding communities. This comes down to concluding that the DRC has invested and leveraged the enforcement of legislation in relation to EIA and PGE to promote the well-managed environment and protect nature, promote the socio-economy life of workers and local communities. This goes to say that, the DRC's approach to using EIA and PGE as tools to promote the application of the concept of sustainable development in the mining sector is similar to that of developed countries like Canada, the US and Australia and other developing countries such as South Africa and Chile. Nevertheless, it should be known that the environmental impact assessment procedure and the development of the environmental management plan require highly technical knowledge and experience people to identify the risks associated with mining activities and how to prevent or solve them. That why developed

countries have put in place efficient institutions and officials to deals with matter associated with mining and the environment (Easterly, 2003 and Young, 2002).

So, given the technical nature of the application of the EIA and the EMP, the government has set up training mechanism for its officials and local community outreach programs for the implementation of innovation of environmental legilsation. But, the investigation conducted in the city of Lubumbashi and Kolwezi reveals that at government officials were not trained in this regards as an officials from the Department of environment stressed that "…*our most challenges is skills training and capacities in the executions of EIAS and EMPs, monitoring and evaluation*". Furthermore, the process of preparing environmental impact assessments in accordance with the law is often tainted by an irregularity related to the non-participation and inclusion of local communities. Theses process are used by corrupt officials for self-enrichment, which evident by the glaring lack of verification of environmental impact studies filed by the mining companies (NGO representative, 2016). But also, the study uncover that, due to financial transactions involved in this process, there is an institutional conflict between the departments of the provincial environment and the national ministry of mine on the other hand. Officers form the department of environmental affairs in the city of Lubumbashi in 2016, deplores the fact that in most cases their service are not associated in the process of EIAs submitted for reviews to the Ministry of Mines in Kinshasa. This situation is confusing when provincial environmental officers now called upon to conduct field surveys to assess the application of environmental legislation in mines in term of EMP execution. NGOs representative and two representatives of mining companies who participated in our research point to the lack of expertise and knowledge in the hands of most government officials in charge of evaluation and control. The interviews conducted with government officials in accordance with mining officials reveals that the majority of officials in charge for EIA's evaluation and EMP monitoring lack the necessary environmental management or science training. For example, in the Katanga Mining and Environment Division, only one in seven officials have received some form of environmental management training.

In addition to the lack of experience, there is also the fact that some state agent uses the procedure of verification of the implementation of EIAs and EMP to ask for a bribe and does not check the implementation of environmental management (EMP). As a consequence of its practice of corruption and lack of expertise, the quality of nature has deteriorated significantly because of mining activities. For example, since 2002, the year of the

promulgation of the mining code, the number of mining companies has increased, leading at the same time to considerable damage to the environment, displaced families and poverty in the Katanga Copper Belt (Atibu *et al*., 2018, Pourret *et al*. 2016, Butsic *et al*., 2015 and Mees *et al*., 2013).

Despite the environmental legislation in place, the results of the surveys conducted in the Katanga Copper Belt demonstrated that the lack of qualified human resource is not the only cause, but there is also ignorance and lack of general education of all mining stakeholders about their environment right and obligations as well as the environmental reforms. For example, Tate *et al*., (2003) note that the way in which people perceives the environment and protect it also depend on their education in relation to the environment. Therefore, it is important that if the Congolese government is to promote sustainable mining practice to invest in the promotion of training education on the implementation of environmental legislation in the mining sector. For this reason, the following section discussed the shortcomings identified in the implementation process of environmental legislation in the mining sector.

6.2.2 Government deficit to uphold environmental legislation in the mining sector

Bechtel *et al*. (2009) and Ascher (1999) argue that most developing country governments have developed outstanding environmental legislation with the intention to protect the environment and develop the community, but their implementation is significantly affected by lack of professionalism, rigour and above all corruption which gangrene the state apparatus. According to Fredrikson *et al*. 2004 and Cole 2007), the government deficit is particularly noticeable in the mining company's assessment of law enforcement, which gives rise to corruption and blocked better prevention of damage to the environment and human health. Nevertheless, if we disapprove the behaviour of government officials who act for lack of professionalism and tramp in the corruption, the mining company responsible for pollution evades their responsibility to prevent or reduce the pollution.

Indeed, as stated in Chapter 3, the reforms of environmental legislation started in 2002 have not only introduced the concept of sustainable development but also the principle of prevention, the precautionary principle, the principle of environmentally sound and effective management, the principle of anticipation, the principle of participation and the principle of

polluting pays. All this principle enumerated above paved the way for government officials to monitor environmental legislation implementation and to punish those polluting the environment. But, contrary to the spirit of environmental legislation, evidence from the field-based research in the Katanga Copper Belt demonstrates that only very limited enforcement is been conducted by the officials. The study showed that enforcement is done in the form of payment of environmental taxes and check the list of procedures of document to be submitted. When the question was asked to the government officials to know why it challenging to efficiently uphold the environmental legislation in the mining sector? the respondents complained about the "… *the lacks of financial means and understaff to lead control and evaluation*". Consequently, the evaluation of EIAs or EMPs is funded by the same companies that are supposed to be evaluated. This practice seriously hampers the state's action in preventing environmental degradation and assessing environmental legislation implementation. Furthermore, the study observed a lack of a systematic approach to environmental legislation implementation due to lack of expertise and financial support. Hence, most acts of government officials reduced to verification on paper in the forms of tics box. Thus, it is our opinion that for a country like the DRC which contains enormous natural resources that can help develops the country, while protecting the environment to invest in the education training to improves the implementation of environmental legislation. One of the aspects that need much improvement is the administration and judicial control of environmental legislation implementation to defend the interest of the local population. But at this level, the most important thing is to delimit the role of administrative and judicial control included form.

6.2.3 Administrative and judicial control in the implementation process of environmental legislation in the Mining Sector

Abazar *et al.* (2004) and Campbell *et al*. (2009) argues that administrative and judicial controls in the implementation of environmental legislation should take the form of an audit with the aim to assess the progress of mitigation strategies, rehabilitation measures by mining companies. Nevertheless, government official must have the necessary skills to freely conduct the evaluation of EIA in order to the violations of environmental legislation or possible act that could lead to degradation of nature (George *et al*., 2013, Dalal *et al*., 2012, Hilson *et al*., 2002). The advantage of administrative and judicial control is that it will prevent mining companies from taking advantage of government weakness to make a profit while damaging the environment. This is an important aspect of environmental management

in the mining sector as the control would take place before, during and after the mining activities in accordance with the spirit of the mining regulation of 2003 in its article 459 which says that "every two years as from the date of Approval of the EIA of the initial project, the holder of a mining or quarry right is required to conduct an audit at his own expense by an approved office other than the one that prepared the initial EIA of the project or EMP." The spirit of this legislation is to force all mining operators to respect and uphold the environmental legislation in their operations. This implies that the mining operator must conduct environmental impact assessment in compliance with the law with the participation of all stakeholders to identify possible impacts and put in place EMP which must be monitored through administrative and judicial control.

Indeed, although environmental legislation provides for administrative and judicial control over environmental enforcement, the DRC Constitution or other legislation is silent on how local communities can seize the state when the mining operator fails to comply with the legislation. Mining stakeholders interviewed agreed that environmental legislation is an essential tool for promoting sustainable development in the mining sector. Nevertheless, in the context of a weak state with weak governmental institutions, administrative and judicial control is essential to prevent abuses and corruption (Rothstein and Teorell, 2008; Helmke and Levitsky, 2004; Harlow, 2006). But also the control procedure must be planned and inclusive to all mining stakeholders as argued by Dalal *et al*., (2009, Schachter, 1991 and Krutilla *et al*., 1985) views that environmental legislation relating to the protection of the environment will also have to take into account the public concerned or probable affected people by the projects. This is important in the context of the DRC with a high rate of corruption, public involvement will help prevent some contamination of nature by mining activities which in some cases are irreversible and can take years to repair. Thus, it will have to comply with the provisions of the Aarhus Convention, which provides in Article 9, paragraph 2b that the sufficient interest and the violation of a right shall be determined in accordance with the provisions of domestic law and in accordance with a goal justice system. Nevertheless, the administrative and judicial control must be balanced between the need to protect the environment and the sustainable development of the local community as well as the country's needs for economic growth. The reasoning for this is that too many rules can kill the law and its main objectives and scare potential investors.

Furthermore, the administrative and judicial control is justified by the fact that mining companies main objective is to make a profit and can capitalise on governance deficit to make more profit and quickly (Goode 2010; Glyn, 2007; Tuner, 1997). In this regards, Greener, 2012; Perks, 2012 and Garrett *et al.* 2009) stressed that sometimes mining companies can take advantage of government weakness if possible to make a profit on their investment and pass sell the companies to another owner or declare for bankruptcy to avoid penalties at a later stage.

An example of weaknesses of a government signing a mining contract with less consideration for the environmental protection aspects has also been observed in the way the Congolese government signed a certain mining contract since 2002. Indeed, the DRC was weakened financially by years of civil wars and saw an opportunity to bail out the state coffers through high demand for copper and cobalt on the market. Therefore, the authorities began signing mining contracts, neglecting administrative and judicial control over the implementation of environmental legislation for the protection of the environment (Badie 2011, Matti 2010 and Mazalto 2009). Example from developed countries showed that they have one thing in common in their approach to upholding the legislation in their sustainable mining practice approach, which is strengthening judicial and administrative control for compliance. Nevertheless, public control also plays a vital role as custodian of the land through the control of government officials (Haufler, 2013, Sumiani *et al*., 2007 and Fox *et al*., 2002). Therefore, the next section discussed the public control approach in implementing the process of environmental legislation for the promotion of sustainable mining practice.

6.2.4 Public control in the implementation process of environmental legislation in the mining sector

Kootz *et al*., 2010; Doh *et al*., 2006 and Hahn 1991) public control plays an important role in the implementation process of environmental legislation for the promotion of sustainable mining for efficiency and profitability in the decision-making process. In addition, public control facilitates the rational and better implementation process of environmental legislation (Epstein 2018, Welford 2014, Doelle 2006 and Shrivastava 1995). For this reason, the legislation in DRC recommended public participation as a mean for control in the 2011 Environmental Law and DRC 2003 Mining Regulation as well as the mining code of 2002. This recommendation is in line with the principles of the Rio Declaration on the Environment and Sustainable development practice. This recommendation has also been reinforced by

Recommendation 97 of the Agenda 21 Action Plan, which calls on all Member States to facilitate public participation in the management and control of the natural environment. It is one of the most effective ways to enforce environmental legislation in mining activities for the promotion of sustainable mining when it is applied (Lafferty *et al*., 2013, Hemmati, 2012 and Pahl-wost, 2009).

Public control over the implementation of environmental legislation should be based on the principles of environmental protection and sustainable development which include awareness, alert, management and participation (Lavielle, 1998). Although some of these missions may be associated with different stages of environmental protection, two essential dimensions may be used to recognize them. Firstly, is the contribution of NGOs to the formulation of environmental legislation and secondly NGO facilitation process of implementation and compliances to environmental legislation in the mining sector. Furthermore, public control can help can improve environmental management in the mining sector based on the principle of participative democracy (Prieur, 1997). Public control and participation in mining will further advance the role of environmental legislation in advancing democratic principles of environmental and human rights.

The purpose of mobilisation of all mining stakeholder in the case of the Katanga Copper belt would be to create a regional partnership in order to ensure sustainable development and to guarantee a better future for all. In this regard, Kitaba (2012:36) notes that "the participation of all stakeholders brings to eco-development its social and political dimensions; it introduces an idea of freedom and control of the decision-making process, which is an important element for human development". Thus, community participation in the implementation of environmental legislation becomes a tool for the development and protection of the natural environment, but also a way to better promote sustainable mining practices and sustainable development of local communities. This approach is also recommended by article 10 of the Rio Principles on the Democratisation of Environmental Management and Local Community Development, it suggests that "it is preferable to address environmental issues by involving all affected populations at the appropriate level". This means taking into account all mining stakeholders views such as men, women, youth, indigenous people, farmers, NGOs, local authorities, business operators, and companies.

The involvement of local communities in the process of environmental legislation implementation in the mining sector and the decision-making process will empower all

stakeholders and control the behaviour of each other to avoid any ecological effects (reference). Furthermore, the participation of local communities will guarantee the promotion and preservation of local traditions as noted by Chindji (1997) that local government and community organisation should ensure that environmental legislation for the protection of the environment is efficiently applied to promote sustainable development and that all elements of life are protected and not polluted. The community participation in environmental legislation implementation will benefit mining activities in the sense that it will help preserve the quality of life while promoting economic growth. Hence, Plummer *et al*., (2013; Anderson *et al*., 2013 and Feeney, 1998) argues that local community participation ensures that all essential elements of life are protected during the execution of the mining project as well as to ensure acceptable and tolerable negative impacts and behavioural changes. Furthermore, local community participation in the environmental legislation implementation should take place keeping in mind that, local communities are the guardians of their natural environment (Savit, 2013; Glasson and Therivel, 2013). Hence, their approval will guarantee the adoption of the mining project and may protect it against any attacks.

In the context of the Katanga Copper Belt, community participation will not only help mining sectors to refrain from any action that could have a negative impact on the natural environment, but also to act as control agent over other stakeholders. This means helping mining companies, NGOs and government institutions to provide each other and local communities with information on strategies for the protection of the environment and sustainable development of local communities. Therefore, information sharing becomes an essential component of environmental legislation implementation in the mining sector. In this approach, the state government will play the role to facilitate access to information and enable stakeholder participation. However, for this approach to succeed, it will require a well-established local community organisation and efficient training programmes to support mining sector actions. These organisations will operate from civic education and ethical guidelines principles for the benefit of all. This is because it will take a joint effort to get the government to strengthen environmental legislation enforcement, monitoring and control of the mining-related activities (Miserendino *et al*., 2013; Franks 2012 and Fabiana-Li, 2009). Therefore, an example of such approach is seen in Equador mining practice where a closer relationship of all stakeholders followed by information sharing ensure the success of environmental legislation implementation and sustainable mining practice (Miserendino *et al*., 2013).

Thus, from the above analysis, it must be noted that public control and its participation in the implementation of environmental legislation in the mining sector of the Katanga Copper Belt is important for the protection of nature but also the sustainable development of the local population. Thus, in the next section, the study analysed the promotion of sustainable local community development approach by the mining sector.

6.3 Environmental legislation implementation for sustainable development of local communities in the Katanga Copper belt

Roseland (2000) argues that the development challenges of countries of the south in term of sustainable development are related to underdeveloped of their socio-economic infrastructure and poor service delivery. In the same way, the case study of Katanga Copper Belt revealed a lack of adequate socio-economic infrastructures capable of supporting a secondary industry away from mining activities. Among the most notable socio-economic challenges of the region are; all weather road network, electricity supply, water supply, hospital and schools. Therefore, special attention should be given to socio-economic development through the provision of services and infrastructure development by the government. Local government on their part have the responsibility to direct mining revenue and resources towards sustainability challenges facing local communities (Toronto Declaration on World Cities and Their Environment, 1991). In order to promote the right of local communities to development and a healthy environment, the Congolese government made provision trough Article 53 and 58 of the Constitution of February 2006 which stipulates that “Everyone has the right to a healthy environment conducive to its full development. The State takes care of the protection of the environment and the health of the populations”. Article 58 of the Constitution gives all Congolese citizens the right to enjoy the proceeds of natural resources. It provides that: “All Congolese have the right to enjoy the national wealth. The State has the duty to redistribute equitably and guaranty the right to development”. This implies that mining companies must engage in social reinforcement programs by building local communities and creating socio-economically resilient communities that are affected by mining activities. In this regard, Ruttah (1991) argued that mining companies should take concrete actions for poverty alleviation because of the nature of their activities on the environment. Therefore, based on this affirmation, in the next section, the study discussed the socio-economic development approach of local communities in the Katanga Copper Belt.

6.3.1 Socio-economic development approach of local communities in the Katanga Copper Belt

The socio-economic development plan of mining companies in the Katanga Copper belt constitutes all the mechanisms offered by the companies to encourage the plan of development revival. In the context of the study and the Katanga Copper belt, the term development implies the social experience of the populations to which the exploitation sector aims. These include physical infrastructure development (hospitals, schools, roads), but also the creation of structures that prepare the mining environment for better mining activities. This mainly concerns the protection of the school-system, ecology, pollution, the protection of energy resources as well as the adequate means for their use in the social field.

The mining code of 2002 also addresses these issues by advocating for the participation of foreign investors in a community development project. But, the idea of mining companies' involvement in a development project is not welcomed by all investors. Some mining companies argue that their primary activity is mining the natural resources and pay taxes to the government who has the responsibility to develop the community. In this respect, it is essential to underline that the mining contracts as understood in the organic legislation of the DRC, community development is the prerogative of the government, based on this assertion, the Congolese state must take care of its population and moreover, protecting its immediate local environment for the benefit of local community.

Indeed, the study of the Katanga Copper Belt reveals that the mining companies such as Tenke Fungurume mining, Kamoto Copper, Mutanda Mining and Anvil mining to mention only that are engaged in voluntary social activities commonly known as corporate social Responsibility (CSR). The study noticed that mining companies in the Katanga Copper Belt make provisions for small clinics, rehabilitation of schools, some forms of vocational training and limited agricultural activities as part of their CSR programs. Consider less of this approach local community, members of the community complained about the fact that sometimes mining operators are "*hiding behind CSR to suggest they are doing something for the community*" (Extract from NGO representative interview, 2016). Indeed, mining companies around the world have become more aware of the impacts of their activities on the environment (Eptein, 2018, Noe et al., 2017, Jenkins 2006 and Donovan, 2002). Thus, the social activities of the mining companies are part of the logic of the concept of 'social responsibility' or recently there is the talk of the 'Global Compact' program, an initiative

launched by the UN to mobilize mining companies operating in developing countries to compensate on the loss and impact on the environment. For example, the Katanga Copper belt study revealed that mining companies such as Tenke Fungurume Mining, Kamoto Copper, Mutanda Mining and Anvil Mining have become more aware of the risks associated with the impacts of their activities and the non-respect of social and environmental laws. (Bryceson *et al*. 2016, Andre *et al*. 2014, Mathysen *et al*. 2013 and Tsurukawa *et al*. 2011).

Then, in addition to voluntary actions, international financial institutions are responding to global pressure from international bodies such the United Nations and commitments made through international conventions and treaties to develop strategies to ensure that the mining companies which they finance comply and take into account the social and environmental impacts of their activities. The international regulations of mining activities that they are reported in mining companies report are International Financial Corporation (IFC) and the International Financial Corporation (IFC) 2006). Nevertheless, most mining companies operating in the Katanga province are guilty of environmental pollution and their corporate social engagement is very limited (Shinn, 2016; Cuvilier *et al*., 2014; Methembu, 2009 and Mazalto, 2009). So, the question we ask ourselves is: why, despite the national legal provision and international convention, the daily experience of local communities not changed? To answer this question, Mthembu-slate 2009 informs us that the Congolese state has abandoned its obligation of development vis-à-vis its population in the hands of mining companies for sometimes. But the mining companies complained that because of the corruption and lack of experience of state agents, their socio-economic intervention does not reach the major part of the populations' concerned (Fieldwork material, 2016).

In addition, Principle 13 of the Stockholm Declaration states that: "In order to achieve a more rational management of resources and thus to improve the environment, State government should adopt an integrated and coordinated approach to their development planning in a way that is consistent with the need to protect and improve the environment for the benefit of the population. " This principle is enshrined in the 2006 Constitution of the DRC which states that "all Congolese have the right to enjoy national wealth. The state must equitably distribute the national wealth and guarantee the right to development". The empirical study of the Katanga Copper belt revealed that the government institutions are fighting for the implementation of these principles because of pressing socio-economic challenges that force the government to neglect specific rights in environmental protection and community

development (Ilunga, 2013 and Kippin 2008). However, the question is, is it possible for the Katanga Copper Belt to solve their environmental problems and ensure socio-economic development through environmental legislation? The answer to this question, according to Mayda, is yes. Nevertheless, legislators and government institutions should pay attention to the conceptual approach of environmental legislation and its practical application (ibid.). Similarly, McGarity (2004) argued that all environmental laws should aim to protect and enhance the human environment. In fact, in the mining sector, environmental legislation should be the cornerstone of sustainable mining practices. The challenge for developing countries, however, is to strike a balance between the needs of economic growth, job creation and environmental protection.

The regulatory objectives of environmental programs can be divided into two main categories: acceptable risks and pollution reduction (McGanity, 2004). Environmental legislation in this context, therefore, plays a vital role in determining the level of acceptable risk and prevents any form of misinterpretation. This is essential because mining activities are inherently negative for the environment. Therefore, the main practical approach for mine managers should be to identify the acceptable risk of mining activities in accordance with the country's environmental legislation and to put in place contingency plans to combat pollution. However, Ridl and Couzens (2010) pointed out that "the environment is a myriad complex of interdependent components, the understanding of which requires both specialized and general environmental skills, even when the question seems to be simple in purely scientific terms. A multidisciplinary approach is needed. Fuggle and Robbie (2010) point out that "complexity is caused, inter alia, by the interdependence of environmental elements, indirect and cumulative causes of effects that are not easily predictable, and the diversity of environments and conditions. Therefore, the government role would be to monitor the compliance of mining activities with acceptable risks and pollution control plans. However, due to the technicality of environmental legislation implementation, the government must emphasis on the education training of it’s the officials in charge of the implementation and community awareness.

Nevertheless, it should be noted that it would be risky to plan the development of a community without the involvement of all the stakeholders in the mining sector in accordance with the requirements of environmental legislation in the DRC and the principle of sustainable development. So in the next section, we will discuss the issue of the collaboration of all stakeholders in the mining sector.

6.3.2 Environmental legislation deficiency in promoting local community development

The results of the study conducted in the Katanga Copper Belt revealed that local communities or villages that fall within a mining concession are not directly entitled to the mineral resources. Local communities are only entitled to the land on which their settlement is built. Article 279 of the Mining Code of 2002 stipulates that mining activities must not disrupt the use of public goods such as roads, the national park, airports and cemeteries. Nevertheless, the holder of a mining permit has a preferential right over the occupants of the land, as stated in Article 280 of the Mining Code of 2002. Therefore, any farm field that falls into the mining perimeters automatically becomes mine's property. The study observed and learned that in some case, the resettlements of the local communities have been conducted with less attention to their cultural attachments of land and activities. Moreover, financial compensation does not equate to the loss of their livelihood activities. The empirical study revealed that it is the mining companies that determine the value of the field or farms to be compensated locally. Mutombo (2016) pointed out that since 2006, many local communities' farmers lost their fields and mining companies are determining the terms of compensation and land value. As a result, many local communities in the Katanga Copper Belt have lost their fields or farmlands and years of operation due to mining activities.

The practice in the Katanga Copper Belt, which consists mainly of recovering agricultural land for mining activities, raises questions about the types of community development and the sustainability approach of mining companies. The study showed that local communities in the Katanga Copper Belt depend on natural resources for their livelihoods. However, since mining activities have increased and most of the land has been occupied, many community members have lost their fields and sources of income and livelihoods. In some cases, local farmers have abandoned their farming activities to adopt the practice of artisanal mining for a quick financial profit. Artisanal mining activities have been presented as an alternative activity to agriculture. Regardless of this situation, little attention is paid to the compensation approach for people affected by mining activities.

The disturbing discovery of the study is also the resettlement approach which consisted of government institution trusting the mining companies to decide the value of the compensation and the approach has limited administrative involvement of government officials or community consultation. In the meantime, the application of the principles of sustainable

development required that for any decision or action to be sustainable and to produce sustainable results, it must take into account all stakeholder views (Cohen, 2017; Crane and Matten, 2016). Furthermore, in some cases, local communities receive money or promises for employment while knowing that the majority of the members of the local communities who are directly affected by the mining projects are not educated. Thus, the study found that the money and jobs promised to local communities in compensation for the loss of their livelihood are given to people who are not from the region. This type of practice has resulted in the perpetration of local poverty and the displacement of communities without adequate compensation or socio-economic infrastructure for growth. Thus, in some areas, the socio-economic situation before the mining activities in the area remains the same even after ten years of mining activities. This situation raises the question of how mining revenues are redistributed to local communities.

From a social point of view, the study reveals that irrespective of the increase of mining investment in the Katanga Copper Belt, the study participant in local community complained about unemployment. Furthermore, Chinese and Indians mining operators are using the artisanal mining system to buy minerals resources and by-pass administrative controls of working conditions and quality remunerations. Therefore, it must be noted that mining companies must comply with national and international environmental standards to protect the biodiversity of the area in which they operate and promote the socio-economic development of the local community. The study discovered that at the end of each year mining companies report on their sustainability which includes community development projects. However, the socio-economic impacts of their actions are difficult to evaluate during mining activities, but the impacts of their activities on the environment are palpable. Local communities are left out by both the government and the mining companies, even though the legislation requires their active participation. The study views that due to irregularities and corruption, some of the sustainability reports are not submitted to the public for criticism. Hence, this becomes more of a compliance activity for financial clearance purposes than promoting sustainable mining practice.

6.4 Stakeholder engagement in the implementation of environmental legislation: Communication and collaboration

The exploitation of the natural resources of the Katanga Copper Belt must be done with respect to the ecological balances of the planet. However, this goal cannot be achieved

without the active involvement of all mining stakeholders (Garrett, 2016; Hund *et al*., 2013; Mazalto, 2013). Given that the concept of sustainable development affects all areas of the integration of human society, there must be a form of contract between man and nature. Therefore, the success of stakeholders' participation in the implementation of environmental legislation in mining depends on the level of stakeholder collaborations and communication. Moreover, the success of mining activities in any given community also depends on communication with the local communities, in order to gain community acceptance for the mining project (Prno, 2013). Therefore, it is important to note that, the concept of sustainable development can lead to challenges that can affect the areas of integration of human society (Sacquet, 2003). These challenges include recycling of renewable resources, revise accountability systems, the protection of biodiversity and sustainable exploitation of non-renewable resources (Sacquet, 2003). In order to overcome these challenges, it is essential to integrate environmental legislation in mining through stakeholder communication and collaboration for the promotion of sustainable mining and sustainable development of local communities in mining areas (Prno, 2013; Prno *et al*., 2012 and Jenkins *et al*., 2006). Due to weak community participation, the first step of stakeholder collaboration will start with community participation to identify the communities' needs and ensure acceptance of mining activities as well as safety.

However, the study of the Katanga Copper Belt revealed one disturbing fact about the lack of stakeholder communication and collaboration in the process of implementing environmental legislation in the mining sector which is one of the causes of corruption. Even though all key study respondents acknowledge the catalytic role of environmental legislation for the protection of the environment as well as sustainable development of the local community, they do not collaborate on strategies or communicates challenges to one other. This view is in line with the ICMM (2006) affirmation that the interaction between mining stakeholders is an essential factor for sustainable mining practice. Bintu (2010) adds that environmental legislation application is entrusted to a government institution for the interest of the public. Thus, the success of environmental legislation will require efficient and active collaboration among government institutions but also with other mining stakeholders.

Collaboration and communication involve the sharing of information with all stakeholders on identified potential mining impacts, mitigation strategies as well as development plans (Combs, 2014 and Esteves, 2012). This approach will help stakeholders to work hand in hand

for mitigating the potential impact of mining activities and challenge each other to achieve local community development based on mining activities. Hence, in this context, the sharing of crucial information on environmental quality, control and monitoring as recommended by environmental legislation becomes essential for the protection of the environment and sustainable development of communities.

Indeed, although a legal provision encourages the participation, the communication and the collaboration of the actors of the mining sector, the study revealed that environmental legislation for the promotion of sustainable mining in the Katanga Copper Belt suffers from a lack of information sharing. Furthermore, mining stakeholders do not produce and disseminate information in a transparent manner. The process by which information will be generated and distributed to the stakeholders will determine the level of compromise and promote sustainable mining practices. The sharing of information will play the levelling role so that all interested parties can participate on an equal footing in the decision-making and implementation process of environmental legislation. For example, the EIA procedure that includes consultation of local communities must be followed by the administrative and legal control to ensure that each stakeholder has been consulted and that all their concerns were included in the final report. However, the ideal level of communication and collaboration between mining stakeholders can only be achieved through an improved planning process of local authorities and government institutions as a starting point.

Healye's (1993) discussion of collaborative planning in the context of fragmented societies such as the case of the DRC suggests that the collaborative planning approach should be considered as the starting point for the configuration of governance modes. Therefore, stakeholders' collaboration in the mining sector can provide environmental legislation implementation with a perfect link and communication network to achieve the desired objectives. The issues related to the natural environment concern everyone, thus the strength of the network communication in the mining sector will be based on communication and collaboration between individuals, public agencies, private agencies and businesses in society. In the same vein, Booher et al., (2002) argued that various participants in a network for a joint task can develop shared meanings and common heuristics that guide their actions. Therefore, the first step in the promotion of sustainable mining environmental legislation is the establishment of an efficient communication and collaboration network for the promotion of sustainable mining.

The use of communication and collaboration networks in the mining sector can help people from different cultures with different ideas and educational backgrounds to get an understanding of the issues that can affect their lives. However, government officials have an essential role to play in serving and acting on behalf of local communities to promote their constitutional right to clean environment and access to natural resources. Furthermore, the communicative and collaborative approach in the implementation process of environmental legislation is crucial in order to maximise mining revenues and mitigate the negative impacts of mining activities. For this reason, in the context of the Katanga Copper Belt, the government and especially the Mining Department, and the Department of Environmental Affairs have an important role to play in balancing the needs of mining companies, economic growth and social benefits of local communities. In this regard, Friedman (1971) stressed that is it is important for government institutions to be excessively flexible, adaptive and opportunistic with the potential to adapt to external forces. Thus, stakeholders' collaboration and communication will help the mining sector to face and plan for external forces in terms of commodity prices, mining closures and natural disasters. all stakeholders must be informed of any externalities and be prepared on how to handle the aftershocks.

In most cases, mining investments in the Katanga Copper Belt are characterised by foreign direct investments (Alves, 2013; Tsurukawa et al., 2011 and Honke, 2010). Therefore, communication and collaboration for the implementation of environmental legislation for the promotion of sustainable mining should be extended to the countries of origin of the financial investment or the headquarters of the mining company to help host countries reduce the governance deficit (Rich and Moberg, 2017; Frank, 2015 and Vervoeke, 2013). Government institutions in this context will play a key role in facilitating the process of communication between local communities and mining companies including NGOs to compel governments and mining companies to be generous (Watson, 2002). The collaboration between the host country and the country of investment origin will be to compel the mining company to the same standard of practice and transparency where their operations are located. The legitimacy of this approach lies in its susceptibility to bring and revive the ownership and stewardship of all stakeholders in the implementation of environmental legislation. Therefore, through the process of communication and collaboration, new ideas on environmental stewardship and socio-economic resilience can emerge and lead to alternative approaches of development and promotion of sustainable mining practice as well as community development (Berkes *et al*., 2013; Prno, 2013 and Hilson *et al*., 2000).

6.5 Introducing a systematic management approach for the implementation process of environmental legislation to promote sustainable mining practice

Findings from the Katanga Copper Belt seem to suggest that environmental legislation is an important tool for advocating the sustainable management of the environment and sustainable development within the local community in mining areas. However, despite having elaborate environmental policies as illustrated in section 5.2 of the thesis, the Democratic Republic of Congo appears to be struggling with promoting sustainable mining practices and sustainable development within the local community. In the case of the Katanga Copper Belt corruption that involves the misuse of Environmental Impact Assessment (EIA) initiatives seems to be the main deterrent. EIA tools are used to identify and possibly alleviating project hazard and negative environmental and social impacts. However, the effects of EIA as recommended by the legislation depend on how EIA findings are implemented and on whether these findings will be used in further decision-making processes.

A study by Welsch (2002) on corruption, growth and the environment argue that there is a significant link between corruption and ambient pollution that is most apparent when comparing corruption and income levels in developing countries. Furthermore, (Auty 2001) has also highlighted that large income inequalities and social capital accumulation can cause political conflict and obstruct institutional development. Findings from the Katanga Copper Belt suggest that bureaucratic and political corruption is obstructing environmental legislation application in the mining sector. For example, corruption practices, lack of human resource are profound which in turn affects the manner in which EIA is conducted and approved. This is evident in the lack of application of EIA recommendation. As a result, water and soil contamination have become a norm in the city of Lubumbashi (Naviundu) and Kolwezi. Instead of using EIA as an environmental management tool to detect possible negative impacts and possible solutions, EIA has become a source of corruption and personal gain for many government officials. Similar views were shared by Williams and Dupuy (2017) in a study on corruption and environmental impact assessment where it was discovered that EIA processes and phases of implementation in Albania did not necessarily match the empirical reality of public environmental decision making, especially in less mature EIA systems such as those of the DRC. Therefore, in order to address some of these implementation deterrents in this section of the work, the author presents a novel approach to improve legislation implementation and promote sustainable mining.

To counteract the lack of governance characterised by corruption the DRC needs strong government institutions to implement policies as well to prosecute those who contravene the law. Nevertheless, strong institutions require political will, qualified human capital, improved remuneration and transparency in the management of mineral resources. Kolstad and Wig (2009) argue that political corruption is most prevalent in resource-rich countries because of the political elite control huge resource rents. This type of corruption is supported by bureaucratic corruption that affects the implementation and efficiency of environmental legislation in countries such as the DRC.

Kolsta *et al.* (2009) however have concluded that the effect of transparency on corruption is not unconditional but necessary and provides sufficient conditions to reduce corruption. In addition to this, transparency will require access to information and the ability to process the information and act on the processed information (*ibid*). According to Deming (1994), new knowledge comes from outside the system. This means that a system cannot fully understand itself and that its transformation requires new knowledge. Thus, the present study proposes a new systemic management approach for understanding the implementation of environmental legislation in the mining sector that is based on knowledge and education.

According to Svensson (2005), education gives an individual or a group of people the ability to process information which may lead to the reduction of corruptions. Furthermore, education facilitates transparency that comes in the form of freedom of expression and press freedom on corruption which may spark community interest that could lead to their participation in mining projects (Lindsed and Naurin, 2005). The Global Promotion for Transparency Initiative (EITI) has expressed similar views. The systemic management approach as suggested in this study has shown its strength in business, government and NGOs that significantly mimic the organisational models of the industrial revolution and the command and control structure model of the military (Mottola et al., 2011). Organisations are made up of people and, as such, are complex systems. Hence, the success of the new paradigm will depend on the management system approach of co- an organisation based on the interdependence of all mining stakeholders because of the trust and openness that underlies each interaction. However, having information on the conduct or performance of public servant is off little benefit if agents do not have the ability to punish abusers of office (Kolsta et al (2009). Furthermore, transparency could reduce bureaucratic corruption by making corruption public servant acts riskier but this should be done by providing good incentives to public officials and the selection of honest and well trained public servant.

Similar views were further expressed by Kolsta and Soreide (2009) in a study that focused on natural resources and corruption. Where the authors went on to suggest that resource-rich countries should rather prioritise institutions that address rent-seeking and benefaction instead of macroeconomic management.

Deming (1997) argues that a system is an "interdependent component of networks that work together to try to achieve the goal of the system". Thus, it is important to acquire "deep knowledge to transform the society in which we live". For this reason, Deming (1997) has proposed four pillars of philosophy that must guide the development of new systems. These four pillars include system appreciation, understanding of variation, the theory of knowledge, and psychology. It should be noted that a system is more than just the sum of its parts, but it is also adaptive, dynamic, self-preserving and sometimes results in evolutionary behaviour (Meadows, 2007). Thus, highlighting the complexity of the system to be applied within the Katanga Copper Belt will require knowledge and understanding from all stakeholders to tackle the issue of corruptions in order to promote sustainable mining practice.

The systemic approach as proposed by the study will have the following pillars in order to succeed:

- Firstly the public disclosure of mining companies' payment to governments in order to allow citizens to hold government accountable (Haufler, 2010). This approach will have the advantage to help improve the management of natural resources, reduce corruption and mitigate conflict (EITI);
- Secondly increase public participation and civil society in the decision-making process (Marshall, 2001);
- Thirdly improve collaboration of mining stakeholders and mining companies to ensure that no part of an agent's commission/payment is passed by the agent as a bribe (Davies, 2000) and lastly;
- Mining stakeholders should comply with compulsory international regulations, maximise transparency, effective detection and enforcement to enhanced accountability.

The proposed systemic management approach for efficient implementation of environmental legislation and reduction of corruption in the mining sector is summarised in **Figure 6.1 below**

The starting point of the environmental legislation implementation in this system is shown by the arrow in blue which begins with Knowledge and capacity building. From knowledge the arrow point to key mining stakeholders which needs to acquire knowledge of the legislation and put in place necessary capacities for the implementation. Henceforward, the arrow in red spread to mining stakeholders who are vested with the responsibility to uphold the legislation through transparency that is made possible via communication and collaboration. In addition, the implementation process is supported by carrots, sticks and nudged approach for better results of promoting sustainable mining practice elements which are all interconnected by the black arrows.

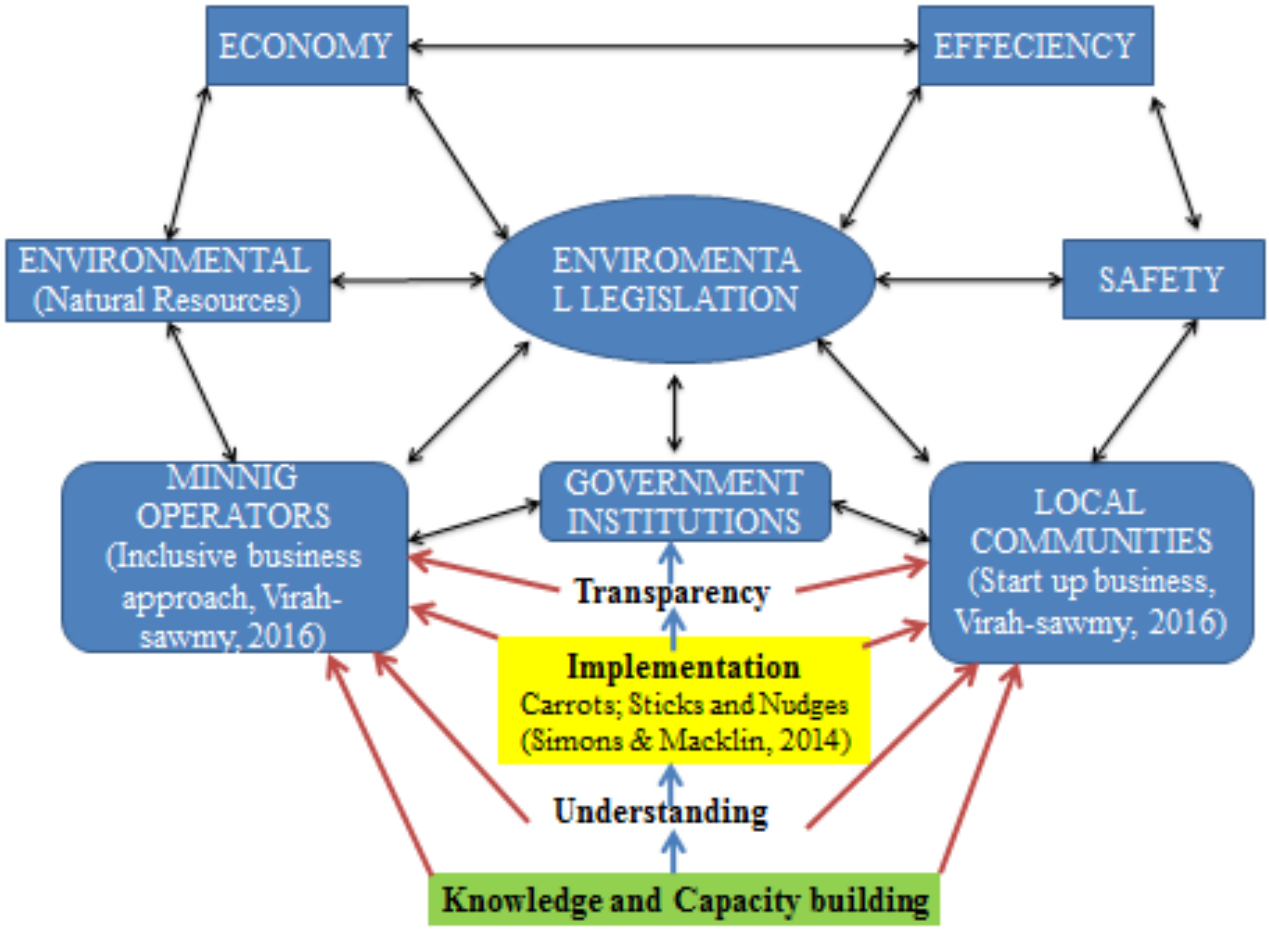


Figure 6.1: Proposed Environmental legislation implementation system for the promotion of sustainable mining

The systematic management approach for environmental legislation in the mining sector as proposed by the study is to be applied within an inclusive business model system as defined by the United Nations Development Program UNDP (2008) which states that inclusive

business are those that engage the poor along the entire supply side as employees, producers and business owners. Hence, Ashley (2009) notes that the current trend in the mining sector is to push for more inclusive business and this movement has gained more momentum because it is seen as one of the most promising strategies benefiting poor people in developing countries through care commercial operations. Furthermore, the inclusive business model has the potential to reach a scale well beyond most direct development interventions (Wach, 2012) or traditional CSR policies. Therefore, the study proposal as shown in **Figure 6.1** first emphasises knowledge. Mining companies and the government should strive to increase the knowledge of the local community through education and training with the aim to increases environmental; legislation compliances and poverty alleviation. This is in line with Ali and Faircheallaigh (2007) assertion that sustainable mining could be achieved if there is an effective conversion of the natural capital, represented by mineral resources, to social capital that would allow for long-term social-economic gain. Furthermore, in parallel, investment in environmental capital is also achieved and this would embrace the notion of sustainable mining (ibid).

One of the main issues identified in the application of environmental legislation in the mining sector of the Katanga copper belt is corruption and lack of qualified human resources and an educated community can process information about environmental legislation application and compliance by both government and mining companies. This is because it will be an advantage for co-workers and community to get information relevant to environmental legislation and monitor implementation as well as denounce misconduct. In addition to this, based on knowledge all mining stakeholders can communicate and collaborate efficiently in accordance with the countries legislation and international regulation that impose on mining company to involve all stakeholders' especially local communities in decision-making processes, mining activities and environmental management.

Furthermore, Figure 6.1 shows a link between the implementation of environmental legislation, knowledge and understanding to avoid uncertainty in the implementation of the mining project and conflict within local communities. The link between knowledge and understanding can help mining companies implement successfully their self-regulation on socio-economic interventions. Virah-Sawmy (2016) argues that in developing countries, mining companies have failed to successfully implement developmental needs of communities, reparation for damage and loss of livelihoods as well as to address environmental degradation caused by mining and this is in spite of CSR policies which are in

place within many companies. Thus, a systematic approach to the implementation of environmental legislation can help mining stakeholder connect the local community's needs to mining development projects. Therefore, given the weakness underlying traditional CSR policies (for the social license to operate) within the extractive industries, a case is made that the sector turns towards a more inclusive business model in the future for enhancing long term social economic and environmental goals (VirahSawmy, 2016). The key constituent in this approach is that efficient implementation of environmental legislation based on knowledge and understanding can help mining companies provide the necessary links to achieve different socio-economic outcomes that can be categorised as follows:

- One of the most effective ways for mining companies to spread their economic benefit to the region and local communities is to become an inclusive business partner, thereby increasing the number of local goods and services they purchase. Furthermore, growing inclusive strategies in the extractive industry can become a significant agent of change multiplier effect on the resilience of the local economy and social development and smooth their own transition during the closing phases of the mining company and activities (Virah-Sawmy, 2016);
- A systemic approach to environmental legislation implementation can help national regulations to strategically support local procurement within the extractive industries (Virah-Sawmy, 2016). For example, using the model on **Figure 6.1**, the government can offer groundwork for inclusive business by developing business incubators dedicated to funding new and start-up companies to develop services to be provided to companies operating in the mining sector. (Virah-Sawmy, 2016).

The links on **Figure 6.1** complete the sequence with transparency through the application of environmental legislation, international regulations and effective detection of corruption and unlawful behaviour of mining companies towards the environment. Thus according to Virah-Sawmy (2016), the implementation of inclusive business approach within the extractive industries would be far less complex by comparison to measuring implementation of traditional CSR policies aimed at securing a social license to operate. The idea of systematic management and inclusive business is also supported by Hilson (2012) who suggested that the lack of enforcement of traditional CSR policies is one of the main contributing factors for their failure in developing countries'. An example of inclusive business and environmental regulations was put in place in 2008 by the provincial government in Katanga province ordering mining company to grow at least 500 h of maize; a staple food for subsistence in

Katanga through local communities' empowerment programs and local procurement (Virah-Sawmy, 2016).

The culmination of the systematic management approach to environmental legislation application in the mining sector as presented in **Figure 6.1** is efficient management of the environment and the protection of the environment. It is a well-known fact that mining projects tend to leave a large footprint on biodiversity, livelihoods and land use, not only due to direct operative impacts, but also from indirect impacts related to the activities of migrant workforce and associated hierarchy (to avoid, minimise, restore and offset) as on actual framework within which the mining sector can manage risks and impacts to biodiversity, ecosystem services and people (Business and Biodiversity Offset Program BBOP, 2013; ICMM and IUCN, 2013) the mitigation hierarchy is linked to the company's biodiversity impacts (BBOP, 2013). Hence, the entire sequence of the proposed systematic approach can help mining stakeholder mitigate the negatives impact of mining activities on biodiversity. An example of this approach is applied by Anglo Platinum mining project in Limpopo region of South Africa which aimed to ensure that community affected by mining activities benefit from their biodiversity compensation initiatives by supporting and financing the development of ecotourism initiatives (Anglo Platinum, 2009).

6.6 General implication

According to Goodland (2012), the benefits to mining corporations in a socially responsible way include reduced labour deficiencies by investing in the local education and skills training. This will lead to improved consistent production resulting in a healthier workforce. Furthermore, skills training and education will reduce conflict by building better relationships within local communities by means of functioning communication discourse to deal with stakeholders' grievance. Furthermore, education and skills training will accelerate access to financing because of lower perceived risk by equity markets.

The most important attribute of these interventions is the efficiency in which implementation of environmental legislation in the mining activities of the Katanga Copper Belt for environmental management and sustainable development of local communities takes place. Integration of environmental legislation through communication and collaboration of all mining stakeholders will help reduce the governance gap that has been the leading cause of environmental degradation, poverty, and displacement. For example, active participation of

all stakeholders through effective communication and collaboration will result in a deliberate effort by all players to administer the environmental legislation. Hence, the combined environmental legislation application decision will have a long-lasting effect but also a binding effect. Mining activities will take place in all confidence, and local communities will be assured of a clean environment through the protection of soil, water and air, as well as equitable redistribution of mining income through socio-economic infrastructure development and job creation. This approach aims to eliminate bullying, bribery and corruption among mining stakeholders. Local communities will not be at the receiving end but equal partners in mining activities taking place in the respective areas.

The second important attribute is that these interventions address the feasibility of a critical aspect of the concept of sustainability in the mining activities of the Katanga Copper Belt, which is equity. There has to be an equitable approach to all three aspects of sustainability that form part of the study analysis framework. It must be noted that one of the roles that environmental legislation plays in mining is to bring about balance and equity which can only be achieved when environmental legislation is efficiently applied and upheld by all stakeholders. The study intervention is for environmental mining management and a decision-making process to be done on the basis that, current mining activity must not weaken the ability of future generations to meet their needs. Therefore, current mining activities must be used as a catalyst for the industrial development of an alternative secondary industry upon which the next generation will rely on for survival. Therefore, it is essential to manage the economic system so that current mining activities contribute to efficient distributing of current resources, maintaining and improving assets so that the next generations can survive (Repetto, 1985: 10). As a result of this approach, the study interventions will have balanced impacts on all three aspects of sustainability rather than just economic sustainability. The details of the economic, social and environmental implications of the study's recommendations are discussed in detail in the next section.

6.7 Conclusion

It is clear from the analysis and discussion of the study results that, the environmental legislation requires the rule of law and good governance in order to be more efficient in the protection of the quality of the environment and the promotion of sustainable livelihood of local communities in mining areas. Thus, in this chapter, the study argues that it is possible

for the DRC to develop the country sustainably using the mining sector with limited negative impacts on the natural environment.

Hence, the study further argues that due to the technical nature in the administration of the environmental legislation in mining activities, it is crucial for the government to emphasise human resources development through training and retention strategies to attract and retain qualified officials. The significance of this argument is that the study shows that there is a severe deficiency of qualified resources. Furthermore, due to the size of the Katanga region, qualified government officials must also be in numbers in order to cover the entire region. The relevance of quality and quantity of human resources in the administration of environmental legislation in mining activities is that it is the government officials who are at the forefront with enormous responsibilities to uphold the country's legislation in the mining sector. Therefore, in some cases, mining companies take advantage of the weakness of the government to uphold the law so that they can maximise their profit. This is done in some mines which are owned by the Chinese and Indians. Government officials also use this weakness to engage in corruption activities.

Arguably bridging the governance gap in environmental legislation administration will require the severity of administrative and judicial control of mining activities even though environmental legislation applicable to mining activities has captured the concept of sustainable development. Environmental legislation also includes rules and regulations to sanction environmental offenders. An excellent example of good governance and the rule of law contributing to the better application of environmental legislation in the mining sector are in countries such as Canada, Australia, and South Africa. The particularity of promoting sustainable mining through environmental legislation is that it requires the rule of law and good governance.

Thus, there is a need for the DRC to start thinking systematically about environmental legislation administration and the management of the mining sector for sustainable management of the environment and sustainable development of local communities. This approach has the advantage to facilitate the integration of environmental legislation and government institution in the mining sector through communication and collaboration.

CHAPTER SEVEN

CONCLUSIONS AND RECOMMENDATIONS

7.1 Introduction

This chapter is a general concluding chapter of the study which focuses on the analysis of the role of environmental legislation for the promotion of sustainable mining. This chapter outlines the key findings of the study as well as makes policy recommendations and areas for future research. However, regardless of the introduction of the concept of sustainable development in the mining policies of the Katanga Copper Belt, the study shows an increase in environmental degradation and local community poverty. Therefore, it was important for the study to analyse how environmental legislation captures the concept of sustainable development in promoting a sustainable mining practice for future sustainability. Using the three pillars of sustainability, the study attempts to shed light on how an efficient environmental legislation administration can contribute to sustainable mining practices for future sustainability. The use of sustainable development principles allowed the study to analyse not only the current situation of the environmental and socio-economic impacts of mining activities but also to find ways to promote sustainable mining practices for future sustainability.

This chapter is divided into four sections. The first section presents a summary of the key findings of the study. The second section is dedicated to the study recommendation. In the third and last section includes concluding remarks, and future research avenues.

7.2 Recapitulation of key findings of the study

Based on the results of the study presented in Chapter 5 and the analysis and discussion in Chapter 6, it is evident that the critical findings of issues surrounding the role of environmental legislation for the promotion of sustainable mining in the Katanga copper belt include:

- Poor governance characterise by lack of qualitative and quantitative national human resources, amateurism of government institutions, lack of motivation, lack of communication and collaboration among stakeholder, poor community participation,

conflict of interest, and corruption;

Regardless of sustainable development principles, the status quo of current mining development practice in the Katanga Copper Belt shows that the promotion of sustainable mining practices is far from becoming the norm in mining development projects. The challenge is that one of the critical tools for promoting a sustainable mining practice such as an EIA is not effectively conducted for the good of the local communities and the promotion of sustainable development of local communities.

- Poor integration of EL in the environmental management of mining activities leading to severe environmental degradation.

  In the Katanga Copper Belt mining activities are the main contributors to environmental risks to natural elements such as land, soil, and water and air quality. These natural elements are important for the development of secondary industries, even though a number of local communities are employed by mines, directly and indirectly, in which case the workers are poorly paid.

  Therefore, it is essential to be aware of the proximity between poverty and environmental degradation because the natural resources that local communities rely on for their economic, social and cultural well-being are exhausted by mining activities. Hence, sustainable mining practised in the Katanga Copper Belt should be pursued keeping in mining that many local communities rely on natural resources for survival.
- The opacity of state agencies and some government departments in the management of environmental mining and the redistribution of mining revenues for the sustainable development of the local communities;
- Lack of political will and leadership to improve the management of the mining sector.

  Critical aspects of mining projects in the Katanga Copper Belt, such as development planning, socio-economic and environmental bases, and impact assessment work, tends to be fragmented and under-integrated.

It is important to note that, if the DRC is going to develop as a country the main identified issues in the study need to understand and addressed systematically through systematic approaches such as those suggested in Chapter 6. Nevertheless, this approach will require

carefully looking at stakeholder's engagement, community participation, improving human resource training and retention strategies. Although the Katanga Copper Belt is also an important agricultural hub due to soil quality and rain, its agricultural sector remains artisanal and unable to meet the food needs of local communities while mining activities continue to flourish. All indications, such as economic, social and environmental, show that the Katanga Copper Belt is still unable to innovate and implement sustainable development practices in mining development projects for future sustainability.

7.3 Recommendations

In order to overcome the identified challenges in the governance gap of the mining sector and environmental legislation, it would be recommended to exercise a real administrative and judicial control for the holders of the mining rights and of actually researching. Involvement of the interested and affected stakeholders is required because it is their environment which undergoes all the implications from mining. The mandatory inclusion of appropriate environmental clauses in the conclusion of mining operations with mining companies would be an asset in the administration of the environmental legislation.

7.3.1 Policy recommendations

Given the study findings, the study makes the policy recommendation to pave the ways for sustainable environmental management of the environment reforms and sustainable development of the local community in mining areas of the Katanga Copper Belt.

It should be noted, however, that while environmental legislation deals with the protection of the quality of air, water and soil, it also needs to be used in conjunction with the land law which deals with the enjoyment of land with regard to the soil surface of the land where local communities live, build, cultivate, and hunt. Specific to environmental protection concerning mining activities are the following laws:

- Law No. 15-026 of 31 December 2015, relating to water;
- Law No. 18-001 of 9 March 2018, reforming the Mining Code repealing and supplementing Law No. 007-2002 of 11 July 2002, the Mining Code;
- Law No. 15-012 of 1 August 2015 on the General Hydrocarbons Regime;
- Law No. 11-2002 of 29 August 2002 on the Forest Code;
- Law No. 11-009 of 9 July 2011 on basic principles relating to the protection

of the environment.

All the laws as mentioned earlier are to be active in order to achieve sustainable mining and sustainable development of local communities. Furthermore, the DRC Constitution of 2006 stipulates that all Congolese have the right to enjoy from mineral resources of the country which can be activated through efficient application of the entire legislation which is an application to mining activities.

However, the application of different legislations applicable to mining and land enjoyment neglects the right of socio-economic development and the right to a clean environment. The manner in which the legislation is applied to protect the environment and the State allocation of land for mining activities led to administrative and legislative conflict resulting in environmental degradation and local community poverty. Therefore, in order for environmental legislation to achieve the desired level of sustainable mining practices, the policies regulating the mining activities must be reviewed and adapted to the context of the DRC.

The new formulation will help address issues such as corruption and transparency and assure that mining resources are used in the best interest of the public and that the environment is protected for future use. Therefore the study proposes the following policy:

- To the President of the Republic: as the guarantor of the nation to take necessary disposition measures to eradicate corruption in the mining sector and fight for transparency in the management of mining resources, environmental management and efficient administration of the Mining Code as well as environmental legislation for the good of the population.
- To local communities: it is essential that they know their environmental rights and internalises the main options of the environmental legislation in order to demand from the environmental and mining authorities a correct application of these laws;
- To the administrative authorities (mayors, the chief of sector and chieftaincy): it is essential to understand that living in a clean environment is a human right recognised by the Constitution. Therefore, there must be the promotion of environmental rights of local communities;
- To the authorities and partners of the judiciary, magistrates of the public prosecutor's office, judges of courts, tribunals and lawyers: it is recommended that

there be excellent interpretation and application of environmental legislation in order to discourage all forms of the illegal mining activities, corruptions and environmental degradation;

- To the Congolese government through the Ministry of Mines and its technical services administrative: Cadastral Mining (CAMI) should be more involved in creating accessible and reliable ZEA. Invest more in the transparent management of mining rights registries and continue the process of revoking dormant titles. SAESSCAM should be provided with means to ensure that this technical service has a coaching and assistance service. The government should comply with the requirements of the EITI by publishing what it receives from extractive companies to improve transparency and the fight against corruption in the mining sector. There should be a continuation of the reform programmes to improve the efficiency of the technical department in the environmental management control services, including up-to-date equipment, technology, training, and monitoring mechanisms to reduce fraud and corruption. There should also be assisted in strengthening the capacities of the Ministry of Mines, and the Ministry of the Environment at the provincial and local level, including the establishment of well-trained and adequately resourced staff. Encourage self-employment investment to promote endogenous development. Encourage the government to improve the working conditions of artisanal diggers and supervise the artisanal sector. Support initiatives to integrate artisanal diggers into the nation-building of industrial mining companies. As well as to give priority to effective reforms aimed at governance and the fight against corruption in the development sector of the general policy for the DRC and establishing a dialogue on this subject with the Congolese government.
- To the industrial actors: there must be compliance with the requirements of the EITI by publishing what is paid to the Congolese State. There must be strict observations of compliance with corporate social responsibility standards and other international principles. There must be open communication with artisanal miners and the local communities while avoiding corruption of some members of the local communities. Promote the endogenous development of the environment where the mining company is installed by electrification, the supply of drinking water, financing of revenue generating activities and financing of social projects. Avoid any fraudulent arrangements to promote corruption and misappropriation of funds.

As well as, ensuring that the working conditions of their employees, as well as those from whom they are supplied, comply with minimum health and safety standards;

- To artisanal actors: artisanal diggers should develop a cooperative initiative to work together and evolve towards semi-industrial exploitation.

7.4 Future research avenues

The mining industry has played an essential role in the development of humanity. However, only a few African countries with natural resource economy bases have been able to use their natural capital sustainably for future sustainability. Although there have been many studies done on mining and sustainability, there are still many other areas which need to be investigated. For example, the current study focuses only on the role of environmental management for the promotion of sustainable mining. The study investigates the manner in which environmental legislation can promote sustainable management of the environment in the context of weak institutions and trigger the sustainable development of local communities from mining activities. Nevertheless, further research is needed in the following areas:

- Conduct research that will provide practical information to train local communities on socio-economic resilience. This kind of research approach will provide much-needed information for future generation development away from mining activities;

Conducts qualitative and quantitative research on environmental rights training which is much needed for both institutions and local communities to defend and protect their rights.

Bibliography

Abadie, D. 2011. Canada and the geopolitics of mining interests: a case study of the Democratic Republic of Congo. *Review of African Political Economy*. 38(128):289–302.

Abaza, H., Bisset, R. & Sadler, B. 2004. *Environmental impact assessment and strategic environmental assessment: towards an integrated approach*. UNEP/Earthprint.

Abbott, K.W. & Snidal, D. 2009. The governance triangle: regulatory standards institutions and the shadow of the state. *The politics of global regulation*. 44.

Abraham, D. 2012. The Battle for New Resources: Minor minerals in green technologies. *RIETI Policy Discussion Papers*.

Acuña, R.M. 2015. The politics of extractive governance: Indigenous peoples and socio-environmental conflicts. *The Extractive Industries and Society*. 2(1):85–92.

Adams, B. 2008. *Green development: Environment and sustainability in a developing world*. Routledge.

Adams, C.A. 2004. The ethical, social and environmental reporting-performance portrayal gap. *Accounting, Auditing & Accountability Journal*. 17(5):731–757.

Adepoju, A. 2008. *Migration in sub-Saharan Africa*. Nordiska Afrikainstitutet.

Afful-Koomson, T. & Owusu Asubonteng, K. 2015. *Collaborative Governance in Extractive Industries in Africa*. United Nations University Institute for Natural Resources.

Africa Mining. 2018. *Mining Companies in the DRC | Mining Industry in the DRC | Projects IQ*. [Online], Available: https://www.projectsiq.co.za/mining-companies-in-drc.htm [2018, November 23].

Akabzaa, T. 2009. Mining in Ghana: implications for national economic development and poverty reduction. *Mining in Africa: regulation and development*. 25–65.

Akitoby, M.B. 2004. *Sources of growth in the Democratic Republic of the Congo: A cointegration approach*. International Monetary Fund.

Aklin, M., Bayer, P., Harish, S.P. & Urpelainen, J. 2014. Who blames corruption for the poor enforcement of environmental laws? Survey evidence from Brazil. *Environmental Economics and Policy Studies*. 16(3):241–262.

Ali, S.H., Giurco, D., Arndt, N., Nickless, E., Brown, G., Demetriades, A., Durrheim, R., Enriquez, M.A., et al. 2017. Mineral supply for sustainable development requires resource governance. *Nature*. 543(7645):367.

Allan, R. 1995. Introduction: sustainable mining in the future. *Journal of Geochemical Exploration*. 52(1–2):1–4.

Allen, R., Letourneau, H. & Hebb, T. 2012. Shareholder engagement in the extractive sector. *Journal of Sustainable Finance & Investment*. 2(1):3–25.

Amezaga, J.M., Rötting, T.S., Younger, P.L., Nairn, R.W., Noles, A.-J., Oyarzún, R. & Quintanilla, J. 2010. *A rich vein? Mining and the pursuit of sustainability*. ACS Publications.

Amisi, M. 2010. Perception de l'impact des activités minières au Katanga. Analyse par l'application de la théorie paysagère de Kevin Lynch.

Andrea, G. 2004. *Development Centre Studies Regional Integration, FDI and Competitiveness in Southern Africa*. OECD Publishing.

Archel, P., Husillos, J. & Spence, C. 2011. The institutionalisation of unaccountability: loading the dice of corporate social responsibility discourse. *Accounting, Organizations and Society*. 36(6):327–343.

Ardron, J.A., Ruhl, H.A. & Jones, D.O. 2018. Incorporating transparency into the governance of deep-seabed mining in the Area beyond national jurisdiction. *Marine policy*. 89:58–66.

ARE, F.O. for S.D. 1987. *1987: Brundtland Report*. [Online], Available: https://www.are.admin.ch/are/en/home/nachhaltige-entwicklung/internationale-zusammenarbeit/agenda-2030-fuer-nachhaltige-entwicklung/uno-_-meilensteine-zur-nachhaltigen-entwicklung/1987--brundtland-bericht.html [2018, November 21].

Armah, F.A., Obiri, S., Yawson, D.O., Afrifa, E.K., Yengoh, G.T., Olsson, J.A. & Odoi, J.O. 2011. Assessment of legal framework for corporate environmental behaviour and perceptions of residents in mining communities in Ghana. *Journal of Environmental Planning and Management*. 54(2):193–209.

Arrow, K.J., Cropper, M.L., Eads, G.C., Hahn, R.W., Lave, L.B., Noll, R.G., Portney, P.R., Russell, M., et al. 1996. Benefit-cost analysis in environmental, health, and safety regulation. *Washington, DC: American Enterprise Institute*. 1–17.

Arumugam, M., Raes, J., Pelletier, E., Le Paslier, D., Yamada, T., Mende, D.R., Fernandes, G.R., Tap, J., et al. 2011. Enterotypes of the human gut microbiome. *nature*. 473(7346):174.

Asante, S.K. 2016. *Regionalism and Africa's development: expectations, reality and challenges*. Springer.

Ascher, W. 1999. *Why governments waste natural resources: policy failures in developing countries*. JHU Press.

Asproudis, E. 2011. Revisiting environmental groups and members' behaviour: budget, size and (im) pure altruism. *Environmental Economics and Policy Studies*. 13(2):139–156.

Aterido, R., Gonzalez, A., Merotto, D., Petracco, C. & Sanchez-Reaza, J. 2018. *Democratic Republic of Congo Jobs Diagnostic*. World Bank.

Atibu, E.K., Lacroix, P., Sivalingam, P., Ray, N., Giuliani, G., Mulaji, C.K., Otamonga, J.-P., Mpiana, P.T., et al. 2018. High contamination in the areas surrounding abandoned mines and mining activities: An impact assessment of the Dilala, Luilu and Mpingiri Rivers, Democratic Republic of the Congo. *Chemosphere*. 191:1008–1020.

Atlin, C. & Gibson, R. 2017. Lasting regional gains from non-renewable resource extraction: The role of sustainability-based cumulative effects assessment and regional planning for mining development in Canada. *The Extractive Industries and Society*. 4(1):36–52.

Australia, M. 2009. The high-stakes game of mining. *Mining Australia*.

Autesserre, S. & Autesserre, S. 2010. *The trouble with the Congo: Local violence and the failure of international peacebuilding*. Vol. 115. Cambridge University Press.

Auty, R. 2002. *Sustaining development in mineral economies: the resource curse thesis*. Routledge.

Aykut, D. & Goldstein, A. 2007. Developing country multinationals: South-South investment comes of age. *Industrial Development for the 21st Century: Sustainable Development Perspectives, New York*. 85–116.

Azapagic, A. 2003. Systems Approach to Corporate Sustainability: A General Management Framework. *Process Safety and Environmental Protection*. 81(5):303–316.

Azapagic, A. 2004a. Developing a framework for sustainable development indicators for the mining and minerals industry. *Journal of cleaner production*. 12(6):639–662.

Azapagic, A. 2004b. Developing a framework for sustainable development indicators for the mining and minerals industry. *Journal of cleaner production*. 12(6):639–662.

Azcue, J. & Nriagu, J. 1999. Arsenic Historical Perspective, Arsenic in Environment. *John Wile & Sons, London, UK*.

Babbie, E. & Rubin, A. 1989. Research methods for social work. *Belmonr, CA: Wadsworth*.

Bailey, K.D. 1994. Methods of social research: qualitative and quantitative approaches.

Baldwin, R. 1998. Introduction in R Baldwin, C Scott & C Hood (eds) A reader on regulations.

Baldwin, R., Cave, M. & Lodge, M. 2012. *Understanding regulation: theory, strategy, and practice*. Oxford University Press on Demand.

Banchirigah, S.M. 2006. How have reforms fuelled the expansion of artisanal mining? Evidence from sub-Saharan Africa. *Resources Policy*. 31(3):165–171.

Banerjee, S.B. 2008. Corporate social responsibility: The good, the bad and the ugly. *Critical sociology*. 34(1):51–79.

Bansal, P. 2005. Evolving sustainably: A longitudinal study of corporate sustainable development. *Strategic management journal*. 26(3):197–218.

Banza, C.L.N., Nawrot, T.S., Haufroid, V., Decrée, S., De Putter, T., Smolders, E., Kabyla, B.I., Luboya, O.N., et al. 2009. High human exposure to cobalt and other metals in Katanga, a mining area of the Democratic Republic of Congo. *Environmental research*. 109(6):745–752.

Barelli, M. 2012. Free, prior and informed consent in the aftermath of the UN Declaration on the Rights of Indigenous Peoples: developments and challenges ahead. *The International Journal of Human Rights*. 16(1):1–24.

Barkemeyer, R., Holt, D., Preuss, L. & Tsang, S. 2014. What Happened to the 'Development' in Sustainable Development? Business Guidelines Two Decades After Brundtland. *Sustainable Development*. 22(1):15–32.

Barnes, T.J. 2000. Inventing Anglo-American economic geography, 1889–1960. *A companion to economic geography*. 11–26.

Barnes-Dabban, H. 2018. Greening African ports: environmental governance transformations in a network society. PhD Thesis. Wageningen University.

Barton, H., Grant, M. & Guise, R. 2003. *Shaping neighbourhoods: a guide for health, sustainability and vitality*. Taylor & Francis.

Basu, K. 2003. *Analytical development economics: the less developed economy revisited*. MIT press.

Basu, A.J. & Baafi, E.Y. 1999. Discrete event simulation of mining systems: current practice in Australia. *International Journal of Surface Mining, Reclamation and Environment*. 13(2):79–84.

Basu, A.J. & van Zyl, D.J. 2006. Industrial ecology framework for achieving cleaner production in the mining and minerals industry. *Journal of Cleaner Production*. 14(3–4):299–304.

Basu, A.K. & Saha, M. 2013. *Studies in Accounting and Finance: Contemporary Issues and Debates*. Pearson Education India.

Bebbington, A., Hinojosa, L., Bebbington, D.H., Burneo, M.L. & Warnaars, X. 2008. Contention and ambiguity: Mining and the possibilities of development. *Development and change*. 39(6):887–914.

Bechtel, M.M. & Tosun, J. 2009. Changing economic openness for environmental policy convergence: when can bilateral trade agreements induce convergence of environmental regulation? *International Studies Quarterly*. 53(4):931–953.

Beder, S. 2013. *Environmental principles and policies: an interdisciplinary introduction*. Routledge.

Benabou, S. 2014. Making up for lost nature?: A critical review of the international development of voluntary biodiversity offsets. *Environment and Society*. 5(1):103–123.

Berger, I.E., Cunningham, P.H. & Drumwright, M.E. 2007. Mainstreaming corporate social responsibility: Developing markets for virtue. *California management review*. 49(4):132–157.

Besada, H. & Martin, P. 2015. Mining codes in Africa: emergence of a 'fourth'generation? *Cambridge Review of International Affairs*. 28(2):263–282.

Bice, S. 2016. *Responsible mining: Key principles for industry integrity*. Routledge.

Biermann, F. 2002. Institutions for scientific advice: Global environmental assessments and their influence in developing countries. *Global Governance*. 8(2):195–219.

Binder, G. 2002. Punishment Theory: Moral or Political? *Buffalo Criminal Law Review*. 5(2):321–372.

Birkeland, J. 2012. *Positive development: from vicious circles to virtuous cycles through built environment design*. Routledge.

Birkland, T.A. 2015. *An introduction to the policy process: Theories, concepts, and models of public policy making*. Routledge.

Blackburn, W.R. 2012. *The sustainability handbook: The complete management guide to achieving social, economic and environmental responsibility*. Routledge.

Blengini, G.A., Garbarino, E., Šolar, S., Shields, D.J., Hámor, T., Vinai, R. & Agioutantis, Z. 2012. Life Cycle Assessment guidelines for the sustainable production and recycling of aggregates: the Sustainable Aggregates Resource Management project (SARMa). *Journal of Cleaner Production*. 27:177–181.

Bloch, V. 2015. Neoliberal Globalization & Africa\' s Conflict Minerals.

Bocken, N.M., Short, S.W., Rana, P. & Evans, S. 2014. A literature and practice review to develop sustainable business model archetypes. *Journal of cleaner production*. 65:42–56.

Bodansky, D., Brunnée, J. & Hey, E. 2008. The Oxford Handbook of International Environmental Law. Ed by. *the edinburgh law review*. 12.

Börzel, T. & Hoenke, J. 2010. From compliance to practice: mining companies and the voluntary principles on security and human rights in the Democratic Republic of Congo.

Börzel, T. & Thauer, C. 2013. *Business and Governance in South Africa: Racing to the Top?* Springer.

Botin, J. 2009. *Sustainable management of mining operations*. SME.

Boutilier, R.G. & Thomson, I. 2011. Modelling and measuring the social license to operate: fruits of a dialogue between theory and practice. *Social Licence*. 1779–96.

Bowler, I., Bryant, C.R. & Cocklin, C. 2002. *The sustainability of rural systems: geographical interpretations*. Vol. 66. Springer Science & Business Media.

Boyle, C.A., Boulet, S., Schieve, L.A., Cohen, R.A., Blumberg, S.J., Yeargin-Allsopp, M., Visser, S. & Kogan, M.D. (in press). Trends in the prevalence of developmental disabilities in US children, 1997–2008. *Pediatrics*. peds-2010.

Bridge, G. 2004. Contested terrain: mining and the environment. *Annu. Rev. Environ. Resour.* 29:205–259.

Bridge, G. 2008. Global production networks and the extractive sector: governing resource-based development. *Journal of Economic Geography*. 8(3):389–419.

Bridge, G. n.d. Mapping the Bonanza: Geographies of Mining Investment in an Era of Neoliberal Reform. 17.

Bridge, G. & McManus, P. 2000. Sticks and stones: environmental narratives and discursive regulation in the forestry and mining sectors. *Antipode*. 32(1):10–47.

Broad, R. 2014. Responsible mining: Moving from a buzzword to real responsibility. *The Extractive Industries and Society*. 1(1):4–6.

Browne, W., Franks, D.M. & Kendall, G. 2011. The Foundations for Responsible Mining in Cambodia–Suggested Approaches.

Brulle, R.J. & Pellow, D.N. 2006. Environmental justice: human health and environmental inequalities. *Annu. Rev. Public Health*. 27:103–124.

Brundtland, G.H. 1987. Our Common Future:„development that meets the needs of the present without compromising the ability of future generations to meet their own needs ". *World Commission on Environment and Development [WCED]*.

Bruns, A. 2014. The environmental impacts of megacities on the coast. In Routledge *Megacities and the Coast*. 46–93.

Bryceson, D.F. & Geenen, S. 2016. Artisanal frontier mining of gold in Africa: labour transformation in Tanzania and the Democratic Republic of Congo. *African Affairs*. 115(459):296–317.

Buckley, R.M. & Kalarickal, J. 2006. *Thirty years of World Bank shelter lending: What have we learned?* The World Bank.

Burawoy, M. 1972. *The colour of class on the copper mines: From African advancement to Zambianization*. Vol. 7. Manchester University Press [for] the Institute for African Studies, University of Zambia.

Burby, R., Dixon, J., Ericksen, N., Handmer, J., May, P., Michaels, S. & Smith, D.I. 2013. *Environmental management and governance: Intergovernmental approaches to hazards and sustainability*. Routledge.

Burchill, J. 2010. Out of the Heart of Darkness: A New Regime for Controlling Resource Extraction in the Congo. *Asper Rev. Int'l Bus. & Trade L.* 10:99.

Burnley, C. 2011. Natural resources conflict in the Democratic Republic of the Congo: a question of governance. *Sustainable Dev. L. & Pol'y*. 12:7.

Bushell, R., Prosser, G.M., Faulkner, H.W. & Jafari, J. 2001. Tourism research in Australia. *Journal of Travel Research*. 39(3):323–326.

Butsic, V., Baumann, M., Shortland, A., Walker, S. & Kuemmerle, T. 2015. Conservation and conflict in the Democratic Republic of Congo: The impacts of warfare, mining, and protected areas on deforestation. *Biological Conservation*. 191:266–273.

Canadian Mining Law. [Online], Available: https://www.stikeman.com/en-ca/kh/canadian-mining-law [2018, November 23].

Calderón, R. & Arce, J.L.Á. 2007. Corruption, Complexity and Governance. *Arce Facultad de Ciencias Económicas y Empresariales Universidad de Navarra Working Paper*. (11/07).

Callaghy, T.M. 1984. The state-society struggle: Zaire in comparative perspective.

Cammack, P. 2004. What the World Bank means by poverty reduction, and why it matters. *New Political Economy*. 9(2):189–211.

Campbell, B. 2003. Factoring in governance is not enough. Mining codes in Africa, policy reform and corporate responsibility. *Minerals & Energy-Raw Materials Report*. 18(3):2–13.

Campbell, B. 2009. *Mining in Africa: regulation and development*. IDRC.

Campbell, B. 2012. Corporate Social Responsibility and development in Africa: Redefining the roles and responsibilities of public and private actors in the mining sector. *Resources Policy*. 37(2):138–143.

Campbell, B. 2013. *Modes of Governance and Revenue Flows in African Mining*. Springer.

Campbell, C.C. 1993. *Birth of a National Park in the Great Smoky Mountains*. Univ. of Tennessee Press.

Campbell, J.L. 2007. Why would corporations behave in socially responsible ways? An institutional theory of corporate social responsibility. *Academy of management Review*. 32(3):946–967.

Cardinale, P. & Greig, L. 2013. Cumulative impact assessment and management: Guidance for the private sector in emerging markets.

Carpintero, Ó., Murray, I. & Bellver, J. 2016. The new scramble for Africa: BRICS strategies in a multipolar world. In Emerald Group Publishing Limited *Analytical Gains of Geopolitical Economy*. 191–226.

Carroll, A.B. 2016. Carroll's pyramid of CSR: taking another look. *International journal of corporate social responsibility*. 1(1):3.

Carstens, J. & Hilson, G. 2009. Mining, grievance and conflict in rural Tanzania. *International Development Planning Review*. 31(3):301–326.

Casper, M. 2001. A definition of "social environment". *American Journal of Public Health*. 91:465.

Caspersen, N. 2013. *Unrecognized states: The struggle for sovereignty in the modern international system*. John Wiley & Sons.

Castro, S.H. & Sánchez, M. 2003. Environmental viewpoint on small-scale copper, gold and silver mining in Chile. *Journal of Cleaner Production*. 11(2):207–213.

Cerin, P. 2006. Bringing economic opportunity into line with environmental influence: A discussion on the Coase theorem and the Porter and van der Linde hypothesis. *Ecological Economics*. 56(2):209–225.

Charles Jr, O.H., Schmidheiny, S. & Watts, P. 2017. *Walking the talk: The business case for sustainable development*. Routledge.

Charter, M. 2017. *Greener marketing: A responsible approach to business*. Routledge.

Chen, S. & Bouvain, P. 2009. Is corporate responsibility converging? A comparison of corporate responsibility reporting in the USA, UK, Australia, and Germany. *Journal of Business Ethics*. 87(1):299–317.

Claessens, S. & Laeven, L. 2003. *What drives bank competition? Some international evidence*. The World Bank.

Clémençon, R. 2012. Welcome to the anthropocene: Rio+ 20 and the meaning of sustainable development. *The Journal of Environment & Development*. 21(3):311–338.

Clements-Croome, D. 2010. *Encyclopedia of sustainability science and technology*. Springer-Verlag New York Inc.

"COD-62645.pdf". n.d. [Online], Available: https://www.ilo.org/dyn/natlex/docs/ELECTRONIC/62645/77450/F-485769511/COD-62645.pdf [2018, July 21].

Code du travail 2018 : la nouvelle édition 2018 très attendue ! n.d. [Online], Available: https://www.village-justice.com/articles/code-travail-2018-nouvelle-e%CC%81dition-2018-tre%CC%80s-attendue,27811.html [2018, July 21].

Cohen, E. 2017. Employee training and development. In Routledge *CSR for HR*. 153–162.

Colchester, M. 2004. Conservation policy and indigenous peoples. *Environmental Science & Policy*. 7(3):145–153.

Collis, J. & Hussey, R. 2013. *Business research: A practical guide for undergraduate and postgraduate students*. Macmillan International Higher Education.

Comité spécial du Katanga Ed. 1935. *Publications relatives à la carte du Katanga*. Brussels: s.n.

COMMONWEALTH, O.A. 1992. National strategy for ecologically sustainable development. *AGPS, Canberra*.

Conley, J.M. & Williams, C.A. 2011. Global banks as global sustainability regulators?: The equator principles. *Law & Policy*. 33(4):542–575.

Constitution of the Republic of South Africa, 1996 | South African Government. 1996. *Constitution of the Republic of South Africa, 1996 | South African Government*. [Online], Available: https://www.gov.za/documents/constitution-republic-south-africa-1996 [2018, November 22].

Coombs, W.T. 2014. *Ongoing crisis communication: Planning, managing, and responding*. Sage Publications.

Cooper, D.R. & Schindler, P.S. 2001. Business Reseacrh Method. 7th.

Corrigan, C.C. 2014. Breaking the resource curse: Transparency in the natural resource sector and the extractive industries transparency initiative. *Resources Policy*. 40:17–30.

Corrigan, C.C. 2017. The effects of increased revenue transparency in the extractives sector: The case of the Extractive Industries Transparency Initiative. *The Extractive Industries and Society*. 4(4):779–787.

Costa, S. & Scoble, M. 2006. An interdisciplinary approach to integrating sustainability into mining engineering education and research. *Journal of Cleaner Production*. 14(3–4):366–373.

Coumans, C. 2010. Alternative accountability mechanisms and mining: the problems of effective impunity, human rights, and agency. *Canadian Journal of Development Studies/Revue canadienne d'études du développement*. 30(1–2):27–48.

Coumans, C. & Kirsch, S. 2011. Occupying spaces created by conflict: anthropologists, development NGOs, responsible investment, and mining. *Current Anthropology*. 52(S3):S29–S43.

Cowell, S.J., Wehrmeyer, W., Argust, P.W. & Robertson, J.G.S. 1999. Sustainability and the primary extraction industries: theories and practice. *Resources policy*. 25(4):277–286.

Cragg, W. & Greenbaum, A. 2002. Reasoning about responsibilities: Mining company managers on what stakeholders are owed. *Journal of Business Ethics*. 39(3):319–335.

Crane, A. & Matten, D. 2016. *Business ethics: Managing corporate citizenship and sustainability in the age of globalization*. Oxford University Press.

Creswell, J.W. 2009. *Mapping the field of mixed methods research*. SAGE Publications Sage CA: Los Angeles, CA.

Creswell, J.W. & Creswell, J.D. 2017. *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage publications.

Custers, R., Matthysen, K. & Service (Antwerp), I.P.I. 2009. *Africa's natural resources in a global context*. International Peace Information Service.

Cuvelier, J.G.R., Van Bockstael, S., Vlassenroot, K. & Wakenge, C.I. 2014. Analyzing the impact of the Dodd-Frank Act on Congolese livelihoods. In SSRC.

Dagnachew, B., Feigenbaum, T., Kadin, S., Lauer, D., Matson, C., Nickerson, N. & Stanard, I. 2017. *Creating Connections Between Environmental and Human Health and Messaging a Call to Pro-Environmental Action*. Partnership for Action Learning in Sustainability (PALS).

Dalal-Clayton, B. & Sadler, B. 2009. Sustainability appraisal. *London: Earthscan.[9] Bell S., and Morse S (2008) Sustainability Indicators. Measuring the Immeasurable*.

Dalal-Clayton, D.B. & Bass, S. 2009. *The challenges of environmental mainstreaming: Experience of integrating environment into development institutions and decisions*. (no. 1). IIeD.

Daly, H.E. & Farley, J. 2011. *Ecological economics: principles and applications*. Island press.

Das, A. 2009. Does firm ownership differentiate environmental compliance? Evidence from Indian chromite mining industry.

Dasgupta, S., Wheeler, D., Mody, A. & Roy, S. 1999. *Environmental regulation and development: A cross-country empirical analysis*. The World Bank.

Dashwood, H.S. 2005. Canadian Mining Companies: And the Shaping of Global Norms of Corporate Social Responsibility. *International Journal*. 60(4):977–998.

Dashwood, H.S. 2007. Canadian mining companies and corporate social responsibility: Weighing the impact of global norms. *Canadian Journal of Political Science/Revue canadienne de science politique*. 40(1):129–156.

Dashwood, H.S. 2012. *The rise of global corporate social responsibility: Mining and the spread of global norms*. Cambridge University Press.

De Luca, G., Maystadt, J.F. & Sekeris, P.G. 2012. Mineral Resources and Conflicts in the Democratic Republic of the Congo A Case of Ecological Fallacy.

De Vos, A.S. 2002. *Research at grass roots: For the social sciences and human services professions*. van Schaik.

Deegan, C. & Gordon, B. 1996. A study of the environmental disclosure practices of Australian corporations. *Accounting and business research*. 26(3):187–199.

Dernbach, J.C. 1998. Sustainable development as a framework for national governance. *Case W. Res. L. Rev.* 49:1.

Dernbach, J.C. 2003. Achieving sustainable development: The centrality and multiple facets of integrated decisionmaking. *Global Legal Studies*. 10(1):247–284.

DESA, U. 2004. Johannesburg Declaration on Sustainable Development. *See http://www. un. org/esa/sustdev/documents/WSSD_POI_PD/English/POI_PD. htm*.

DeSimone, L.D. & Popoff, F. 2000. *Eco-efficiency: the business link to sustainable development*. MIT press.

Dia, M. n.d. A Governance Approach to k lvil Service Reform in Sub-SahararA XNA ca.

Ding, P. & Pigram, J.J. 1995. Environmental audits: An emerging concept in sustainable tourism development. *Journal of Tourism Studies*. 6(2):2.

Disaster Risk - Environmental degradation | PreventionWeb.net. n.d. [Online], Available: https://www.preventionweb.net/risk/environmental-degradation [2018, November 21].

Doane, D. 2005. Beyond corporate social responsibility: minnows, mammoths and markets. *Futures*. 37(2–3):215–229.

Doelle, M. & Sinclair, A.J. 2006. Time for a new approach to public participation in EA: Promoting cooperation and consensus for sustainability. *Environmental Impact Assessment Review*. 26(2):185–205.

Doh, J.P. & Guay, T.R. 2006. Corporate social responsibility, public policy, and NGO activism in Europe and the United States: an institutional-stakeholder perspective. *Journal of Management studies*. 43(1):47–73.

Douglas, J.D. 1985. *Creative interviewing*. Vol. 29. Sage Publications, Inc.

Dovers, S.R. 1996. Sustainability: demands on policy. *Journal of Public Policy*. 16(3):303–318.

"DRC_2014_national-redd-framework-strategy_drc_summary-for-decision-makers_2012.pdf". n.d. [Online], Available: http://www.cafi.org/content/dam/cafi/docs/drc-documents/DRC_2014_national-redd-framework-strategy_drc_summary-for-decision-makers_2012.pdf [2018, November 23].

Drebenstedt, C. 2014. The Responsible Mining Concept–Contributions on the Interface between Science and Practical Needs. In Springer *Mine Planning and Equipment Selection*. 3–24.

Drexhage, J. & Murphy, D. 2010. Sustainable development: from Brundtland to Rio 2012. Background paper prepared for consideration by the High Level Panel on Global Sustainability at its first meeting 19 September 2010.

D'Souza, K. 2005. Artisanal and small-scale mining in Africa: the poor relation. *Geological Society, London, Special Publications*. 250(1):95–120.

Dubiński, J. 2013. Sustainable development of mining mineral resources. *Journal of Sustainable Mining*. 12(1):1–6.

Dudley, N. 2008. *Guidelines for applying protected area management categories*. Iucn.

Duening, T.N. & Click, R.L. 2005. *Essentials of business process outsourcing*. Vol. 34. John Wiley & Sons.

Durning, B. & Broderick, M. 2017. Environmental and social management plans. In Routledge *Methods of Environmental and Social Impact Assessment*. 678–702.

Easterly, W. 2005. What did structural adjustment adjust?: The association of policies and growth with repeated IMF and World Bank adjustment loans. *Journal of development economics*. 76(1):1–22.

Easterly, W. & Levine, R. 2003. Tropics, germs, and crops: how endowments influence economic development. *Journal of monetary economics*. 50(1):3–39.

Eggert, R. 2006. Mining, sustainability and sustainable development. *Maxwell, Australian Mineral Economics*.

Eggert, R.G. 2001. Mining and economic sustainability: National economies and local communities. *A Study Prepared for the Mining, Minerals, and Sustainable Development Project, Colorado School of Mines*.

Elbra, A. 2016. *Governing African Gold Mining: Private Governance and the Resource Curse*. Springer.

Elliott, L. 2004. The global politics of the environment. In Springer *The global politics of the environment*. 223–238.

Emel, J. & Huber, M.T. 2008. A risky business: Mining, rent and the neoliberalization of "risk". *Geoforum*. 39(3):1393–1407.

Epstein, M.J. 2018. *Making sustainability work: Best practices in managing and measuring corporate social, environmental and economic impacts*. Routledge.

Erdiaw-Kwasie, M.O., Alam, K. & Shahiduzzaman, M. 2014. Bettering corporate social responsibility through empowerment and effective engagement practices: An Australian mining perspective. In Vol. 25 *Proceedings of the International Association for Business and Society*. 140–150.

Escobar, A. 2011. *Encountering development: The making and unmaking of the Third World*. Princeton University Press.

Esteves, A.M., Franks, D. & Vanclay, F. 2012. Social impact assessment: the state of the art. *Impact Assessment and Project Appraisal*. 30(1):34–42.

Evangelinos, K.I. & Oku, M. 2006. Corporate environmental management and regulation of mining operations in the Cyclades, Greece. *Journal of Cleaner Production*. 14(3–4):262–270.

Evans, R., Brereton, D. & Joy, J. 2007. Risk assessment as a tool to explore sustainable development issues: lessons from the Australian coal industry. *International Journal of Risk Assessment and Management*. 7(5):607–619.

de Failly, D.S., Ntakobajira, Z.B. & Shonja, L.B. 2013. Tracing Revenue Flows, Governance and the Challenges of Poverty Reduction in the Democratic Republic of Congo's

Artisanal Mining Sector. In Springer *Modes of Governance and Revenue Flows in African Mining*. 164–222.

Fair, D.A., Dosenbach, N.U., Church, J.A., Cohen, A.L., Brahmbhatt, S., Miezin, F.M., Barch, D.M., Raichle, M.E., et al. 2007. Development of distinct control networks through segregation and integration. *Proceedings of the National Academy of Sciences*. 104(33):13507–13512.

Fairhead, J. 2001. International dimensions of conflict over natural and environmental resources. *Violent environments*. 213–236.

Fairhead, J. 2005. Transnational dimensions to environmental resource dynamics: modes of governance and local resource management in Eastern DRC. *Beyond territory and scarcity: Exploring conflicts over natural resource management*. 195–215.

Feris, L.A. 2010. The role of good environmental governance in the sustainable development of South Africa. *Potchefstroom Electronic Law Journal/Potchefstroomse Elektroniese Regsblad*. 13(1):72–99.

Ferraz, M.F.F. 2012. Sustainability beyond mining: transformations in systems for secondary beneficiation.

Fitzpatrick, P., Fonseca, A. & McAllister, M.L. 2011. From the Whitehorse mining initiative towards sustainable mining: lessons learned. *Journal of Cleaner Production*. 19(4):376–384.

Fleurbaey, M., Kartha, S., Bolwig, S., Chee, Y.L., Chen, Y., Corbera, E., Lecocq, F., Lutz, W., et al. 2014. Sustainable development and equity.

Flint, R.W. 2012. *Practice of sustainable community development: a participatory framework for change*. Springer.

Flournoy, A.C. & Driesen, D.M. Eds. 2010. *Beyond environmental law: policy proposals for a better environmental future*. Cambridge [U.K.]; New York, N.Y: Cambridge UniversityPress.

Fombrun, C.J. 2005. A world of reputation research, analysis and thinking—building corporate reputation through CSR initiatives: evolving standards. *Corporate reputation review*. 8(1):7–12.

Fonseca, A. 2010. How credible are mining corporations' sustainability reports? A critical analysis of external assurance under the requirements of the international council on mining and metals. *Corporate Social Responsibility and Environmental Management*. 17(6):355–370.

Forgan, R.S., Sauvage, J.-P. & Stoddart, J.F. 2011. Chemical topology: complex molecular knots, links, and entanglements. *Chemical Reviews*. 111(9):5434–5464.

Fouche, C. & Delport, C. 2002. Research at grass roots: for the social sciences and human service professions.

Fox, T., Ward, H. & Howard, B. 2002. *Public sector roles in strengthening corporate social responsibility: A baseline study*. World Bank Washington, DC.

François, A. 2006. *La partie centrale de l'Arc cuprifère du Katanga: étude géologique*. (Tervuren African geoscience collection no. vol. 109). Tervuren, Belgique: Musée royal de l'Afrique centrale.

Franks, D.M. 2015. *Mountain movers: Mining, sustainability and the agents of change*. Routledge.

Franks, D.M., Brereton, D. & Moran, C.J. 2010. Managing the cumulative impacts of coal mining on regional communities and environments in Australia. *Impact Assessment and Project Appraisal*. 28(4):299–312.

Franks, D.M., Boger, D.V., Côte, C.M. & Mulligan, D.R. 2011. Sustainable development principles for the disposal of mining and mineral processing wastes. *Resources policy*. 36(2):114–122.

Furley, T.H., Brodeur, J., Silva de Assis, H.C., Carriquiriborde, P., Chagas, K.R., Corrales, J., Denadai, M., Fuchs, J., et al. 2018. Toward sustainable environmental quality: Identifying priority research questions for Latin America. *Integrated environmental assessment and management*. 14(3):344–357.

Garrelts, H. & Flitner, M. 2011. Governance issues in the Ecosystem Approach: what lessons from the Forest Stewardship Council? *European journal of forest research*. 130(3):395–405.

Garrett, N. & Lintzer, M. 2010. Can Katanga's mining sector drive growth and development in the DRC? *Journal of Eastern African Studies*. 4(3):400–424.

Garrett, N., Sergiou, S. & Vlassenroot, K. 2009. Negotiated peace for extortion: the case of Walikale territory in eastern DR Congo. *Journal of Eastern African Studies*. 3(1):1–21.

Garvin, T., McGee, T.K., Smoyer-Tomic, K.E. & Aubynn, E.A. 2009. Community–company relations in gold mining in Ghana. *Journal of environmental management*. 90(1):571–586.

Geenen, S. 2012. A dangerous bet: The challenges of formalizing artisanal mining in the Democratic Republic of Congo. *Resources Policy*. 37(3):322–330.

Geenen, S. & Cuvelier, J. 2018. Local elites' extraversion and repositioning: Continuities and changes in Congo's mineral production networks. *The Extractive Industries and Society*. (October, 30).

Geissdoerfer, M., Savaget, P., Bocken, N.M. & Hultink, E.J. 2017. The Circular Economy–A new sustainability paradigm? *Journal of cleaner production*. 143:757–768.

Gentina, J.C. & Acevedo, F. 2013. Application of bioleaching to copper mining in Chile. *Electronic Journal of Biotechnology*. 16(3):16–16.

Germain, R. 2010. *Global politics and financial governance*. Macmillan International Higher Education.

Ghai, D. & Vivian, J.M. 2014. *Grassroots environmental action: people's participation in sustainable development*. Routledge.

Ghorbani, Y. & Kuan, S.H. 2017. A review of sustainable development in the Chilean mining sector: past, present and future. *International Journal of Mining, Reclamation and Environment*. 31(2):137–165.

Gibbs, D. 2000. Ecological modernisation, regional economic development and regional development agencies. *Geoforum*. 31(1):9–19.

Gibbs, D.C., Longhurst, J. & Braithwaite, C. 1998. 'Struggling with sustainability': Weak and strong interpretations of sustainable development within local authority policy. *Environment and Planning A*. 30(8):1351–1365.

Gibbs, J., Kraemer, K.L. & Dedrick, J. 2003. Environment and policy factors shaping global e-commerce diffusion: A cross-country comparison. *The information society*. 19(1):5–18.

Gibson, R.B. 2006. Beyond the pillars: sustainability assessment as a framework for effective integration of social, economic and ecological considerations in significant decision-making. *Journal of Environmental Assessment Policy and Management*. 8(03):259–280.

Gibson, B., Hassan, S. & Tansey, J. 2013. *Sustainability assessment: criteria and processes*. Routledge.

Giddings, B., Hopwood, B. & O'brien, G. 2002. Environment, economy and society: fitting them together into sustainable development. *Sustainable development*. 10(4):187–196.

Gifford, B., Kestler, A. & Anand, S. 2010. Building local legitimacy into corporate social responsibility: Gold mining firms in developing nations. *Journal of World business*. 45(3):304–311.

Gilchrist, V.J. 1992. *Key Informants Interviews, In, Crabtree BF, WL Millar (eds) Doing Qualitative Research: Research Methods for Primary Health Care. Vol3 London*. Sage Publications.

Giurco, D. & Cooper, C. 2012. Mining and sustainability: asking the right questions. *Minerals Engineering*. 29:3–12.

Glyn, A. 2007. *Capitalism unleashed: finance, globalization, and welfare*. Oxford University Press.

Gold, A.S. 2009. The New Concept of Loyalty in Corporate Law. *UC Davis L. Rev.* 43:457.

Golob, U. & Bartlett, J.L. 2007. Communicating about corporate social responsibility: A comparative study of CSR reporting in Australia and Slovenia. *Public Relations Review*. 33(1):1–9.

Golusin, M. & Ivanović, O.M. 2009. Definition, characteristics and state of the indicators of sustainable development in countries of Southeastern Europe. *Agriculture, ecosystems & environment*. 130(1–2):67–74.

Golusin, M., Tesic, Z. & Ostojic, A. 2010. The analysis of the renewable energy production sector in Serbia. *Renewable and Sustainable Energy Reviews*. 14(5):1477–1483.

Gomes, C.M., Kneipp, J.M., Kruglianskas, I., da Rosa, L.A.B. & Bichueti, R.S. 2014. Management for sustainability in companies of the mining sector: an analysis of the main factors related with the business performance. *Journal of Cleaner Production*. 84:84–93.

Goode, R. 2010. *Government finance in developing countries*. Brookings Institution Press.

Goodland, R. 2012. Responsible mining: the key to profitable resource development. *Sustainability*. 4(9):2099–2126.

Goudie, A.S. 2018. *Human impact on the natural environment*. John Wiley & Sons.

Gouvernance du secteur minier et enjeux de développement en ... 2010. [Online], Available: https://dokumen.tips/documents/gouvernance-du-secteur-minier-et-enjeux-de-developpement-en-.html [2018, July 21].

Government of Western Australia. 2015. *Home : NRM WA*. [Online], Available: http://www.nrm.wa.gov.au/ [2018, November 23].

Govindan, K., Kannan, D. & Shankar, K.M. 2014. Evaluating the drivers of corporate social responsibility in the mining industry with multi-criteria approach: A multi-stakeholder perspective. *Journal of cleaner production*. 84:214–232.

Govindan, K., Kaliyan, M., Kannan, D. & Haq, A.N. 2014. Barriers analysis for green supply chain management implementation in Indian industries using analytic hierarchy process. *International Journal of Production Economics*. 147:555–568.

Graham, D. & Woods, N. 2006. Making corporate self-regulation effective in developing countries. *World Development*. 34(5):868–883.

Grant, J.A. 2009. Digging deep for profits and development? Reflections on enhancing the governance of Africa's mining sector.

Great Britain, Poustie, M., Tromans, S., Great Britain, Great Britain, Great Britain & Great Britain Eds. 2003. *Environmental protection legislation*. 4th ed ed. (Sweet & Maxwell's legislation handbook). London: Sweet & Maxwell.

Gudmundsson, H., Marsden, G. & Josias, Z. 2016. Sustainable transportation: Indicators, frameworks, and performance management.

Guenther, B. 2008. The Asian drivers and the resource curse in Sub-Saharan Africa: the potential impacts of rising commodity prices for conflict and governance in the DRC. *The European Journal of Development Research*. 20(2):347–363.

Guest, G., Namey, E.E. & Mitchell, M.L. 2012. *Collecting qualitative data: A field manual for applied research*. Sage.

Gunn, G. 2014. *Critical metals handbook*. John Wiley & Sons.

Gunningham, N., Leadbeter, P., Boer, B. & Australian Centre for Environmental Law Eds. 1999. *Environmental outlook: law and policy. No. 3*. Sydney: Federation Press.

Gunningham, N. & Sinclair, D. 2017. *Leaders and laggards: next-generation environmental regulation*. Routledge.

Habitat, U.N. 2016a. Urbanization and development: emerging futures. *World cities report*. 3(4):4–51.

Habitat, U.N. 2016b. World cities report 2016. *UN Habitat: Nairobi, Kenya*.

Haigh, N. 1992. *Manual of environmental policy: the EC and Britain*. Longman London.

Hamann, R. 2003. Mining companies' role in sustainable development: the'why'and'how'of corporate social responsibility from a business perspective. *Development Southern Africa*. 20(2):237–254.

Hamann, R. & Kapelus, P. 2004. Corporate social responsibility in mining in Southern Africa: Fair accountability or just greenwash? *Development*. 47(3):85–92.

Hamann, R., Kapelus, P. & O'Keefe, E. 2011. Mining companies and governance in Africa. In Springer *Governance Ecosystems*. 260–276.

Handcock, M.S. & Gile, K.J. 2011. Comment: On the concept of snowball sampling. *Sociological Methodology*. 41(1):367–371.

Hansen, R.C. 2006. The impact of the equator principles on lender liability: risks of responsible lending. *Available at SSRN 948228*.

Harlow, C. 2006. Global administrative law: the quest for principles and values. *European journal of international law*. 17(1):187–214.

Hart, R. & Coumans, C. 2013. *Evolving standards and expectations for responsible mining, a civil society perspective*. MiningWatch Canada.

Harwood, T.G. & Garry, T. 2003. An overview of content analysis. *The marketing review*. 3(4):479–498.

Haselip, J. & Hilson, G. 2005. Winners and losers from industry reforms in the developing world: experiences from the electricity and mining sectors. *Resources Policy*. 30(2):87–100.

Haufler, V. 2010. Disclosure as governance: The extractive industries transparency initiative and resource management in the developing world. *Global Environmental Politics*. 10(3):53–73.

Haufler, V. 2013. *A public role for the private sector: Industry self-regulation in a global economy*. Carnegie Endowment.

Heikkurinen, P. 2017. *Sustainability and peaceful coexistence for the Anthropocene*. Routledge.

Helmke, G. & Levitsky, S. 2004. Informal institutions and comparative politics: A research agenda. *Perspectives on politics*. 2(4):725–740.

Hemmati, M. 2012. *Multi-stakeholder processes for governance and sustainability: beyond deadlock and conflict*. Routledge.

Hilson, G. 2000. Sustainable development policies in Canada's mining sector: an overview of government and industry efforts. *Environmental Science & Policy*. 3(4):201–211.

Hilson, G. 2012. Corporate Social Responsibility in the extractive industries: Experiences from developing countries. *Resources Policy*. 37(2):131–137.

Hilson, G. & Basu, A.J. 2003. Devising indicators of sustainable development for the mining and minerals industry: An analysis of critical background issues. *The International Journal of Sustainable Development & World Ecology*. 10(4):319–331.

Hilson, G. & Haselip, J. 2004. The environmental and socioeconomic performance of multinational mining companies in the developing world economy. *Minerals & Energy-Raw Materials Report*. 19(3):25–47.

Hilson, G. & Maconachie, R. 2008. “Good governance” and the extractive industries in Sub-Saharan Africa. *Mineral Processing and Extractive Metallurgy Review*. 30(1):52–100.

Hilson, G. & Murck, B. 2000. Sustainable development in the mining industry: clarifying the corporate perspective. *Resources policy*. 26(4):227–238.

Hilson, G. & Nayee, V. 2002. Environmental management system implementation in the mining industry: a key to achieving cleaner production. *International journal of mineral processing*. 64(1):19–41.

Hilson, G. & Potter, C. 2005. Structural adjustment and subsistence industry: artisanal gold mining in Ghana. *Development and change*. 36(1):103–131.

Himley, M. 2010. Global mining and the uneasy neoliberalization of sustainable development. *Sustainability*. 2(10):3270–3290.

Himley, M. 2014. Mining history: mobilizing the past in struggles over mineral extraction in Peru. *Geographical Review*. 104(2):174–191.

Holstein, J.A. & Gubrium, J.F. 2004. The active interview. *Qualitative research: Theory, method and practice*. 2:140–161.

Holsti, O.R. 1969. Content analysis for the social sciences and humanities. *Reading. MA: Addison-Wesley (content analysis)*.

Hönke, J. 2010. New political topographies. Mining companies and indirect discharge in Southern Katanga (DRC). *Politique africaine*. (4):105–127.

Hopwood, B., Mellor, M. & O’Brien, G. 2005. Sustainable development: mapping different approaches. *Sustainable development*. 13(1):38–52.

Horkheimer, M. 1937. Traditionelle und kritische Theorie. *Zeitschrift für Sozialforschung*. 6(2):245–294.

Horowitz, L. 2006. Section 2: mining and sustainable development. *Journal of Cleaner Production*. 3(14):307–308.

Hu, M. & Liu, B. 2004. Mining and summarizing customer reviews. In ACM *Proceedings of the tenth ACM SIGKDD international conference on Knowledge discovery and data mining*. 168–177.

Huang, Y., Tseng, G.C., Yuan, S., Pasa-Tolic, L., Lipton, M.S., Smith, R.D. & Wysocki, V.H. 2007. A data-mining scheme for identifying peptide structural motifs responsible for different MS/MS fragmentation intensity patterns. *The Journal of Proteome Research*. 7(01):70–79.

Hund, K., Schure, J. & van der Goes, A. 2017. Extractive industries in forest landscapes: options for synergy with REDD+ and development of standards in the Democratic Republic of Congo. *Resources Policy*. 54:97–108.

Hunt, A.J., Farmer, T.J. & Clark, J.H. 2013. Elemental sustainability and the importance of scarce element recovery. *Element Recovery and Sustainability*. (22):1.

Hutchins, M.J., Walck, C.L., Sterk, D.P. & Campbell, G.A. 2007. Corporate social responsibility: a unifying discourse for the mining industry? *Greener Management International*. (52).

ICMM, J. 2006. Good practice guidance for mining and biodiversity.

Idowu, S.O. & Leal Filho, W. 2009. *Global practices of corporate social responsibility*. Springer.

Idowu, S.O., Capaldi, N., Zu, L. & Gupta, A.D. 2013. *Encyclopedia of corporate social responsibility*. Vol. 21. Springer New York.

Ilunga, Y.Y. 2013. An investigation into the social dimensions of mining in Africa: a case study of Kakanda city in the democratic republic of Congo. PhD Thesis. University of Cape Town.

Imbun, B.Y. 2007. Cannot manage without the ‚significant other': Mining, corporate social responsibility and local communities in Papua New Guinea. *Journal of Business Ethics*. 73(2):177–192.

Inoue, M. & Isozaki, H. 2013. *People and Forest—Policy and Local Reality in Southeast Asia, the Russian Far East, and Japan*. Vol. 3. Springer Science & Business Media.

International Institute for Environment and Development. 2002. *Breaking new ground: mining, minerals and sustainable development; the report of the MMSD project*. Earthscan.

James, P.M. 1999. The miner and sustainable development.

Jannou, C. 2015. *The internationalists: Globalization, the age of information and the developing world ascent*. Lulu Press, Inc.

Jansson, J., Burke, C. & Jiang, W. 2009. Chinese companies in the extractive industries of Gabon & the DRC: Perceptions of transparency. *Centre for Chinese Studies–University of Stellenbosch/EITI/Revenue Watch*.

Jarvie-Eggart, M.E. 2015a. *Responsible Mining: Case Studies in Managing Social & Environmental Risks in the Developed World*. SME.

Jarvie-Eggart, M.E. 2015b. *Responsible Mining: Case Studies in Managing Social & Environmental Risks in the Developed World*. SME.

Jenkins, H. 2004. Corporate social responsibility and the mining industry: conflicts and constructs. *Corporate Social Responsibility and Environmental Management*. 11(1):23–34.

Jenkins, H. & Obara, L. 2006. Corporate Social Responsibility (CSR) in the mining industry–the risk of community dependency. *Queen's University Belfast*.

Jenkins, H. & Yakovleva, N. 2006. Corporate social responsibility in the mining industry: Exploring trends in social and environmental disclosure. *Journal of cleaner production*. 14(3–4):271–284.

Jessop, R.D. 2002. *The future of the capitalist state.* Polity.

João, E., Vanclay, F. & den Broeder, L. 2011. Emphasising enhancement in all forms of impact assessment: introduction to a special issue. *Impact Assessment and Project Appraisal*. 29(3):170–180.

JP Spradley – 2016 Participant observation - books.goog... - Google Scholar. n.d. [Online], Available: https://scholar.google.co.za/scholar?hl=en&as_sdt=0%2C5&q=JP+Spradley+%E2%80%93+2016+Participant+observation+-+books.google.com+RW+Budd%2C+RK+Thorp%2C+L+Donohew+-+1967+-+agris.fao.org+Content+analysis+of+communications&btnG= [2019, April 18].

Kang, N. & Moon, J. 2011. Institutional complementarity between corporate governance and corporate social responsibility: A comparative institutional analysis of three capitalisms. *Socio-Economic Review.* 10(1):85–108.

Kassarjian, H.H. 1977. Content analysis in consumer research. *Journal of consumer research*. 4(1):8–18.

Kemp, D. 2009. Mining and community development: problems and possibilities of local-level practice. *Community Development Journal*. 45(2):198–218.

Kemp, D., Bond, C.J., Franks, D.M. & Cote, C. 2010. Mining, water and human rights: making the connection. *Journal of Cleaner Production*. 18(15):1553–1562.

Kemp, D., Owen, J.R. & Van de Graaff, S. 2012. Corporate social responsibility, mining and "audit culture". *Journal of Cleaner Production*. 24:1–10.

Kemp, R., Parto, S. & Gibson, R.B. 2005a. Governance for sustainable development: moving from theory to practice. *International journal of sustainable development*. 8(1–2):12–30.

Kemp, R., Parto, S. & Gibson, R.B. 2005b. Governance for sustainable development: moving from theory to practice. *International journal of sustainable development*. 8(1–2):12–30.

Kennes, E. 2005. The Mining Sector in Congo: The Victim or the Orphan of Globalization? In S. Marysse & F. Reyntjens (eds.). London: Palgrave Macmillan UK *The Political Economy of the Great Lakes Region in Africa: The Pitfalls of Enforced Democracy and Globalization*. 152–189.

Kesler, S.E., Simon, A.C. & Simon, A.F. 2015. *Mineral resources, economics and the environment*. Cambridge University Press.

Kibasomba, R. & Lombe, T.B. 2011. Obstacles to post-election peace in eastern Democratic Republic of Congo: Actors, interests and strategies. *Understanding obstacles to peace: Actors, interests and strategies in Africa's Great Lakes Region. Kampala, International Development Research Centre*. 61–145.

Kiene, W. 2010. Enforcing Industry Codes of Conduct: Challenges and Lessons from Other Sectors 12.

Kippin, H. 2008. Copper & controversy in the DR Congo. *Review of African Political Economy*. 35(117):482–486.

Kirsch, S. 2010. Sustainable mining. *Dialectical anthropology*. 34(1):87–93.

Kiss, A. & Shelton, D. 1997. *Manual of European environmental law*. Cambridge University Press.

Kokko, K., Oksanen, A., Hast, S., Heikkinen, H.I., Hentilä, H.-L., Jokinen, M., Komu, T., Kunnari, M., et al. 2014. *Sound mining in the north: A guide to environmental regulation and best practices supporting social sustainability*. fi= Lapin yliopisto| en= University of Lapland|.

Kokko, K., Buanes, A., Koivurova, T., Masloboev, V. & Pettersson, M. 2015. Sustainable mining, local communities and environmental regulation. *Barents Studies*. 2(1):50–81.

Kolk, A. & Lenfant, F. 2013. Multinationals, CSR and partnerships in Central African conflict countries. *Corporate Social Responsibility and Environmental Management*. 20(1):43–54.

Kondolf, G.M., Gao, Y., Annandale, G.W., Morris, G.L., Jiang, E., Zhang, J., Cao, Y., Carling, P., et al. 2014. Sustainable sediment management in reservoirs and regulated rivers: Experiences from five continents. *Earth's Future*. 2(5):256–280.

Koontz, T.M., Steelman, T.A., Carmin, J., Korfmacher, K.S., Moseley, C. & Thomas, C.W. 2010. *Collaborative Environmental Management: What Roles for Government-1*. Routledge.

Krutilla, J.V., Fisher, A.C. & Fisher, A.C. 1985. *The economics of natural environments: studies in the valuation of commodity and amenity resources*. Resources for the Future.

Kubanza, N.S. & Simatele, D. 2016. Social and environmental injustices in solid waste management in sub-Saharan Africa: a study of Kinshasa, the Democratic Republic of Congo. *Local Environment*. 21(7):866–882.

Kubanza, N.S., Das, D.K. & Simatele, D. 2017. Some happy, others sad: exploring environmental justice in solid waste management in Kinshasa, The Democratic Republic of Congo. *Local Environment*. 22(5):595–620.

Kumah, A. 2006. Sustainability and gold mining in the developing world. *Journal of Cleaner Production*. 14(3–4):315–323.

Kumar, D. & Kumar, D. 2015. *Management of coking coal resources*. Elsevier.

Labonne, B. 1999a. The mining industry and the community: joining forces for sustainable social development. In Vol. 23. Wiley Online Library. 315–322.

Labonne, B. 1999b. The mining industry and the community: joining forces for sustainable social development. In Vol. 23. Wiley Online Library *Natural Resources Forum*. 315–322.

Lafferty, W.M. & Eckerberg, K. 2013. *From the Earth Summit to Local Agenda 21: working towards sustainable development*. Routledge.

Lahiri-Dutt, K. & Robinson, K. 2008. 'period problems' at the coalface. *feminist review.* 89(1):102–121.

Landy, F. 2018. *From Urban National Parks to Natured Cities in the Global South: The Quest for Naturbanity*. Springer.

Laurence, D. 2006. Optimisation of the mine closure process. *Journal of Cleaner Production*. 14(3–4):285–298.

Laurence, D. 2011a. Establishing a sustainable mining operation: an overview. *Journal of Cleaner Production*. 19(2–3):278–284.

Laurence, D. 2011b. Establishing a sustainable mining operation: an overview. *Journal of Cleaner Production*. 19(2–3):278–284.

Lee, V. 2007. Enforcing the Equator Principles: an NGO's principled effort to stop the financing of a paper pulp mill in Uruguay. *Nw. UJ Int'l Hum. Rts.* 6:354.

Lee, N. & George, C. 2013. *Environmental assessment in developing and transitional countries: principles, methods and practice*. John Wiley & Sons.

Levine, R. & Barth, J. 2001. *Bank regulation and supervision: what works best?* The World Bank.

Line, M., Hawley, H. & Krut, R. 2002. The development of global environmental and social reporting. *Corporate Environmental Strategy*. 9(1):69–78.

Liu, J. & Diamond, J. 2005. China's environment in a globalizing world. *Nature*. 435(7046):1179.

Liu, Y., Gupta, H., Springer, E. & Wagener, T. 2008. Linking science with environmental decision making: Experiences from an integrated modeling approach to supporting sustainable water resources management. *Environmental Modelling & Software*. 23(7):846–858.

Livesey, N.J., Read, W.G., Froidevaux, L., Lambert, A., Manney, G.L., Pumphrey, H.C., Santee, M.L., Schwartz, M.J., et al. 2011. Version 3.3 Level 2 data quality and description document. *JPL D-33509*.

Loorbach, D. 2010. Transition management for sustainable development: a prescriptive, complexity-based governance framework. *Governance*. 23(1):161–183.

Lottermoser, B. 2003. Mine Water. In Springer *Mine wastes*. 83–141.

Lynch, B.D. 2012. Vulnerabilities, competition and rights in a context of climate change toward equitable water governance in Peru's Rio Santa Valley. *Global Environmental Change*. 22(2):364–373.

Maconachie, R. 2014. Dispossession, exploitation or employment? Youth livelihoods and extractive industry investment in Sierra Leone. *Futures*. 62:75–82.

Mahanty, S. & McDermott, C.L. 2013. How does 'Free, Prior and Informed Consent'(FPIC) impact social equity? Lessons from mining and forestry and their implications for REDD+. *Land use policy*. 35:406–416.

Mamic, I. 2017. *Implementing codes of conduct: How businesses manage social performance in global supply chains*. Routledge.

Maon, F., Lindgreen, A. & Swaen, V. 2009. Designing and implementing corporate social responsibility: An integrative framework grounded in theory and practice. *Journal of Business Ethics*. 87(1):71–89.

Marshall, K. 2008. *The World Bank: From reconstruction to development to equity*. Routledge.

Marysse, S. 2003. Regress and war: The case of the DRCongo. *The European journal of development research*. 15(1):73–98.

Marysse, S. 2005. Regress, war and fragile recovery: the case of the DRCongo. In Springer *The Political Economy of the Great Lakes Region in Africa*. 125–151.

Matti, S. 2010a. Resources and rent seeking in the Democratic Republic of the Congo. *Third World Quarterly*. 31(3):401–413.

Matti, S.A. 2010b. The Democratic Republic of the Congo? Corruption, patronage, and competitive authoritarianism in the DRC. *Africa Today*. 56(4):42–61.

Mauch, S., Aziz, M.T.A. & Marchich, M. 2003. Programme for the Establishment of the National Moroccan Cleaner Production Centre.

Mayda, J. 1984. Environmental legislation in developing countries: some parameters and constraints. *Ecology LQ*. 12:997.

Mayundo, K.J. 2016. Economic Growth, Natural Mineral Resources and Education in Developing Countries.

Mazalto, M. 2009. Governance, human rights and mining in the Democratic Republic of Congo. *Mining in Africa: Regulation and development*. 187–242.

McBeth, A. 2008. Crushed by an Anvil: A case study on responsibility for human rights in the extractive sector. *Yale Hum. Rts. & Dev. LJ*. 11:127.

McGarity, T.O. 2004. The Goals of Environmental Legislation. *BC Envtl. Aff. L. Rev.* 31:529.

McGee, R.W. & McGee, R.W. 2008. *Accounting reform in transition and developing economies*. Springer.

McHenry, M.P., Doepel, D.G. & Urama, K.C. 2017. Making extractive industries-led growth inclusive: An introduction. *The Extractive Industries and Society*. 4(2):235–239.

McMichael, P. 2012. *Development and social change: A global perspective*. Pine Forge Press.

Meadows, D.H., Meadows, D.L. & Randers, J. 1992. *Beyond the limits: global collapse or a sustainable future*. Earthscan Publications Ltd.

Mebratu, D. 1998. Sustainability and sustainable development: historical and conceptual review. *Environmental impact assessment review*. 18(6):493–520.

Mees, F., Masalehdani, M.N.N., De Putter, T., D'Hollander, C., Van Biezen, E., Mujinya, B.B., Potdevin, J.L. & Van Ranst, E. 2013. Concentrations and forms of heavy metals around two ore processing sites in Katanga, Democratic Republic of Congo. *Journal of African Earth Sciences*. 77:22–30.

Melcher, F., Sitnikova, M.A., Graupner, T., Martin, N., Oberthür, T., Henjes-Kunst, F., Gäbler, E., Gerdes, A., et al. 2008. Fingerprinting of conflict minerals: columbite-tantalite ("coltan") ores. *SGA News*. 23(1):7–14.

Mensah, S.O. & Okyere, S.A. 2014. Mining, Environment and Community Conflicts: A Study of Company-Community Conflicts over Gold Mining in the Obuasi Municipality of Ghana. *Journal of Sustainable Development Studies*. 5(1). [Online], Available: https://infinitypress.info/index.php/jsds/article/view/537 [2019, April 26].

Meyers, R.A. 2018. *Encyclopedia of sustainability science and technology*. Springer.

Middleton, N. 2013. *The global casino: an introduction to environmental issues*. Routledge.

Milder, J.C., Arbuthnot, M., Blackman, A., Brooks, S.E., Giovannucci, D., Gross, L., Kennedy, E.T., Komives, K., et al. 2015. An agenda for assessing and improving conservation impacts of sustainability standards in tropical agriculture. *Conservation biology*. 29(2):309–320.

Miller, T.R., Wiek, A., Sarewitz, D., Robinson, J., Olsson, L., Kriebel, D. & Loorbach, D. 2014. The future of sustainability science: a solutions-oriented research agenda. *Sustainability science*. 9(2):239–246.

Mining, M. 2002. *Breaking new ground: the report of the mining, minerals and sustainable development project*. Earthscan.

Miranda, M., Chambers, D. & Coumans, C. 2005. *Framework for responsible mining: a guide to evolving standards*. MiningWatch Canada.

Moldan, B., Janoušková, S. & Hák, T. 2012. How to understand and measure environmental sustainability: Indicators and targets. *Ecological Indicators*. 17:4–13.

Moore, D. 2001. Neoliberal globalisation and the triple crisis of'modernisation'in Africa: Zimbabwe, the Democratic Republic of the Congo and South Africa. *Third World Quarterly*. 22(6):909–929.

Moran, T.H. 2014. *Multinational corporations and the politics of dependence: Copper in Chile*. Vol. 97. Princeton University Press.

Moran, C. & Kunz, N. 2014. Sustainability as it pertains to minerals and energy supply and demand: a new interpretative perspective for assessing progress. *Journal of cleaner production*. 84:16–26.

Morgan, R.K. 2012. Environmental impact assessment: the state of the art. *Impact Assessment and Project Appraisal*. 30(1):5–14.

Mtegha, H.D., Cawood, F.T. & Minnitt, R.C.A. 2006. National minerals policies and stakeholder participation for broad-based development in the southern African development community (SADC). *Resources Policy*. 31(4):231–238.

Mthembu-Salter, G. 2009. Natural Resource Governance, Boom and Bust: The Case of Kolwezi in the DRC.

Mu, Z., Bu, S. & Xue, B. 2014. Environmental legislation in China: Achievements, challenges and trends. *Sustainability*. 6(12):8967–8979.

Mudd, G.M. 2004. Sustainable mining: An evaluation of changing ore grades and waste volumes. In Vol. 6. 9.

Mullins, C.W. & Rothe, D.L. 2008. Gold, diamonds and blood: International state-corporate crime in the Democratic Republic of the Congo. *Contemporary Justice Review*. 11(2):81–99.

Muradian, R., Walter, M. & Martinez-Alier, J. 2012. Hegemonic transitions and global shifts in social metabolism: Implications for resource-rich countries. Introduction to the special section. *Global environmental change*. 22(3):559–567.

Muraya, J. & Ahere, J. 2014. *Perpetuation of instability in the Democratic Republic of the Congo: when the Kivus sneeze, Kinshasa catches a cold*. (ACCORD occasional paper no. 1/2014). Umhlanga Rocks, South Africa: ACCORD.

Murphy, S. 2010. Corporate partnerships for entrepreneurship: building the ecosystem in the Middle East and Southeast Asia. *Corporate Social Responsibility Initiative Working Paper*. 62.

Musso, J., Weare, C. & Hale, M. 2000. Designing web technologies for local governance reform: Good management or good democracy? *Political Communication*. 17(1):1–19.

Mwitwa, J., German, L., Muimba-Kankolongo, A. & Puntodewo, A. 2012a. Governance and sustainability challenges in landscapes shaped by mining: Mining-forestry linkages and impacts in the Copper Belt of Zambia and the DR Congo. *Forest Policy and Economics*. 25:19–30.

Mwitwa, J., German, L., Muimba-Kankolongo, A. & Puntodewo, A. 2012b. Governance and sustainability challenges in landscapes shaped by mining: Mining-forestry linkages and impacts in the Copper Belt of Zambia and the DR Congo. *Forest policy and economics*. 25:19–30.

Mzembe, A.N. & Meaton, J. 2014. Driving corporate social responsibility in the Malawian mining industry: a stakeholder perspective. *Corporate Social Responsibility and Environmental Management*. 21(4):189–201.

Naeem, M.A. & Welford, R. 2009. A comparative study of corporate social responsibility in Bangladesh and Pakistan. *Corporate Social Responsibility and Environmental Management*. 16(2):108–122.

Nasrullah, N.M. & Rahim, M.M. 2014. CSR in Private Enterprises in Developing Countries. *Evidences from the Ready-Made Garments Industry in Bangladesh*.

Nest, M.W., Grignon, F. & Kisangani, E.F. 2006. *The Democratic Republic of Congo: Economic dimensions of war and peace*. Vol. 53. Lynne Rienner Boulder, CO.

Newman, A., Thanacoody, R. & Hui, W. 2011. The impact of employee perceptions of training on organizational commitment and turnover intentions: a study of multinationals in the Chinese service sector. *The International Journal of Human Resource Management*. 22(8):1765–1787.

Newmont. 2017. *Newmont Beyond the Mine – Our 2017 Social and Environmental Performance Report*. [Online], Available: http://sustainabilityreport.newmont.com/2017/ [2018, November 23].

Nicholls, R. & Richardson, C. 2016. Measuring the Embodied Carbon Content of Concrete Paving. In Leeds Sustainability Institute.

Nonet, P., Selznick, P. & Kagan, R.A. 2017. *Law and society in transition: Toward responsive law*. Routledge.

Nortey, H. 1992. *Public participation in decision-making: A case study of National Capital Commission to integrate public participation into Gatineau Park Master Plan.* University of Ottawa (Canada).

Nwete, B. 2007. Corporate social responsibility and transparency in the development of energy and mining projects in emerging markets; Is soft law the answer? *German Law Journal*. 8(4):311–339.

Nzongola-Ntalaja, G. 2002. *The Congo: From Leopold to Kabila: A People's History*. Zed Books.

OCallaghan, T. 2010. Patience is a virtue: Problems of regulatory governance in the Indonesian mining sector. *Resources Policy*. 35(3):218–225.

O'Callaghan, T., Graetz, G. & Terry, O. 2017. *Mining in the Asia-Pacific*. Springer.

Ochoa, C. & Keenan, P.J. 2011. Regulating information flows, regulating conflict: an analysis of United States conflict minerals legislation. *Goettingen J. Int'l L.* 3:129.

Odenthal, L. 2001. FDI in sub-Saharan Africa.

Ong, D. 2010. From'international'to'transnational'environmental law? A legal assessment of the contribution of the'equator principles' to international environmental law. *Nordic Journal of International Law*. 79(1):35–74.

Otto, J.M. 1997. A national mineral policy as a regulatory tool. *Resources Policy*. 23(1–2):1–7.

Otto, J.M. 1998. Global changes in mining laws, agreements and tax systems. *Resources policy*. 24(2):79–86.

Otto, J. & Cordes, J. 2002. *The regulation of mineral enterprises: A global perspective on economics, law and policy*. Rocky Mountain Mineral Law Foundation Westminster, CO.

"Our-common-future.pdf". n.d. [Online], Available: http://www.un-documents.net/our-common-future.pdf [2018, November 21].

Owen, J.R. & Kemp, D. 2013. Social licence and mining: A critical perspective. *Resources policy*. 38(1):29–35.

Oyarzún, J. & Oyarzún, R. 2011. Sustainable development threats, inter-sector conflicts and environmental policy requirements in the arid, mining rich, northern Chile territory. *Sustainable Development*. 19(4):263–274.

Page, S. & te Velde, D.W. 2004. Foreign direct investment by African countries. In *InWent/UNCTAD meeting on FDI in Africa*.

Pahl-Wostl, C. 2009. A conceptual framework for analysing adaptive capacity and multi-level learning processes in resource governance regimes. *Global Environmental Change*. 19(3):354–365.

Panayotou, T. 2016. Economic growth and the environment. *The environment in anthropology*. 140–148.

Patel, Z. n.d. To what extent is the shift in legislation reflected in mine management protocols: a case of Acid Mine Drainage in Johannesburg.

Patton, M. 2002. Qualitative Research and Evaluation Methods, 3rd edn Sage Publications. *Thousand Oaks, CA*.

Pearce, D.W. & Atkinson, G.D. 1993. Capital theory and the measurement of sustainable development: an indicator of "weak" sustainability". *Ecological economics*. 8(2):103.

Pearson, R., Seyfang, G. & Jenkins, R. 2013. *Corporate responsibility and labour rights: Codes of conduct in the global economy*. Routledge.

Pegg, S. 2006. Mining and poverty reduction: Transforming rhetoric into reality. *Journal of cleaner production*. 14(3–4):376–387.

Penrod, J., Preston, D.B., Cain, R.E. & Starks, M.T. 2003. A discussion of chain referral as a method of sampling hard-to-reach populations. *Journal of Transcultural nursing*. 14(2):100–107.

Percival, R.V., Schroeder, C.H., Miller, A.S. & Leape, J.P. 2017. *Environmental regulation: Law, science, and policy*. Wolters Kluwer Law & Business.

Perks, R. 2012. How can public–private partnerships contribute to security and human rights policy and practice in the extractive industries? A case study of The Democratic

Perrings, C. 1979. *Black mineworkers in central Africa: industrial strategies and the evolution of an African proletariat in the copperbelt, 1911-41*. Heinemann Educational Publishers.

Philip, L.J. 1998. Combining quantitative and qualitative approaches to social research in human geography—an impossible mixture? *Environment and planning A*. 30(2):261–276.

Pietromonaco, P.R. & Barrett, L.F. 2000. Attachment theory as an organizing framework: A view from different levels of analysis. *Review of General Psychology*. 4(2):107.

Placet, M., Battye, R., Fehsenfeld, F. & Bassett, G. 1991. Acidic Deposition: State of the Science and Technology. *Summary Report of the US National Acid Precipitation Assessment Program*. 265.

Pollini, J., Hockley, N., Muttenzer, F.D. & Ramamonjisoa, B.S. 2014. The transfer of natural resource management rights to local communities. *Conservation and Environmental Management in Madagascar. IR Scales (ed.)*. 172–192.

Porter, M.E. & Kramer, M.R. 2006. The link between competitive advantage and corporate social responsibility. *Harvard business review*. 84(12):78–92.

Post, J.E. & Altma, B.W. 1994. Managing the environmental change process: barriers and opportunities. *Journal of Organizational Change Management*. 7(4):64–81.

Pourret, O., Lange, B., Bonhoure, J., Colinet, G., Decrée, S., Mahy, G., Séleck, M., Shutcha, M., et al. 2016. Assessment of soil metal distribution and environmental impact of mining in Katanga (Democratic Republic of Congo). *Applied Geochemistry*. 64:43–55.

Prevention, P. & Resettlement, I. 2012. Biodiversity Conservation and Sustainable Management of Living Natural Resources.

Prior, T., Giurco, D., Mudd, G., Mason, L. & Behrisch, J. 2012a. Resource depletion, peak minerals and the implications for sustainable resource management. *Global Environmental Change*. 22(3):577–587.

Prior, T., Giurco, D., Mudd, G., Mason, L. & Behrisch, J. 2012b. Resource depletion, peak minerals and the implications for sustainable resource management. *Global Environmental Change*. 22(3):577–587.

Prno, J. 2013. An analysis of factors leading to the establishment of a social licence to operate in the mining industry. *Resources Policy*. 38(4):577–590.

Prno, J. & Slocombe, D.S. 2012. Exploring the origins of 'social license to operate'in the mining sector: Perspectives from governance and sustainability theories. *Resources policy*. 37(3):346–357.

Prno, J. & Slocombe, D.S. 2014. A systems-based conceptual framework for assessing the determinants of a social license to operate in the mining industry. *Environmental management*. 53(3):672–689.

PROFESSIONALISATION, A.P.G.O., GARRETT, N., MITCHELL, H. & LINTZER, M. 2010. PROMOTING LEGAL MINERAL TRADE IN AFRICA'S GREAT LAKES REGION.

Rahim, M.M. 2013a. Legal regulation of corporate social responsibility. *CSR, SustainaEility, Ethics & Governance. DOI*. 10:978–3.

Rahim, M.M. & Alam, S. 2014. Convergence of corporate social responsibility and corporate governance in weak economies: The case of Bangladesh. *Journal of Business Ethics*. 121(4):607–620.

Rahman, S. 2011. Evaluation of definitions: ten dimensions of corporate social responsibility. *World Review of Business Research*. 1(1):166–176.

Rainey, D.L. 2010. *Sustainable business development: inventing the future through strategy, innovation, and leadership*. Cambridge university press.

Rajaram, V., Dutta, S. & Parameswaran, K. 2005. *Sustainable mining practices: A global perspective*. CRC Press.

Ramade, F. 2009. *Eléments d'écologie: Ecologie fondamentale-4e édition*. Dunod.

Ravallion, M. & Chen, S. 1999. *What can new survey data tell us about recent changes in distribution and poverty?* The World Bank.

RDC. 2011. *RDC: Constitution (2011), Version Française —*. [Online], Available: http://aceproject.org/ero-en/regions/africa/CD/rdc-constitution-2011/view [2018, November 21].

"RDC-Code-2002-minier.pdf". n.d. [Online], Available: http://www.droit-afrique.com/upload/doc/rdc/RDC-Code-2002-minier.pdf [2018, September 17].

Reed, E. & Miranda, M. 2007. Assessment of the mining sector and infrastructure development in the Congo Basin region. *Washington DC, USA: World Wildlife Fund, Macroeconomics for Sustainable Development Program Office*. 27.

Reeves, S., Albert, M., Kuper, A. & Hodges, B.D. 2008. Why use theories in qualitative research. *Bmj*. 337(7670):631–4.

Revuelta, M.B. 2017. *Mineral Resources: From Exploration to Sustainability Assessment*. Springer.

Ribot, J. 2002. *Democratic decentralization of natural resources: Institutionalizing popular participation*. Washington DC: World Resources Institute.

Rich, B. 2014. *Mortgaging the Earth: World Bank, Environmental Impoverishment and the crisis of development*. Routledge.

Rich, E. & Moberg, J. 2017. *Beyond Governments: Making Collective Governance Work-Lessons from the Extractive Industries Transparency Initiative*. Routledge.

Richardson, T. 2005. Environmental assessment and planning theory: four short stories about power, multiple rationality, and ethics. *Environmental impact assessment review*. 25(4):341–365.

Richert, C., Rogers, A. & Burton, M. 2015. Measuring the extent of a Social License to Operate: The influence of marine biodiversity offsets in the oil and gas sector in Western Australia. *Resources policy*. 43:121–129.

Roberts, C.W. 2015. The other resource curse: extractives as development panacea. *Cambridge Review of International Affairs*. 28(2):283–307.

Robertson, C. 1993. *Real World Research: A Research for Social Scientists and Practitioner-Researchers*. Oxford: Blackwell.

Rockloff, S.F. & Lockie, S. 2006. Democratization of coastal zone decision making for indigenous Australians: Insights from stakeholder analysis. *Coastal Management*. 34(3):251–266.

Rode, J., Wittmer, H., Emerton, L. & Schröter-Schlaack, C. 2016. 'Ecosystem service opportunities': A practice-oriented framework for identifying economic instruments to enhance biodiversity and human livelihoods. *Journal for nature conservation*. 33:35–47.

Rothstein, B.O. & Teorell, J.A. 2008. What is quality of government? A theory of impartial government institutions. *Governance*. 21(2):165–190.

Rubbers, B. 2019. Mining towns, enclaves and spaces: A genealogy of worker camps in the Congolese copperbelt. *Geoforum*. 98:88–96.

Rubin, A. & Babbie, E. 2010. The practice of social research. *Belmont, CA: Wadsworth Cengage*.

Runhaar, H. & Lafferty, H. 2009. Governing corporate social responsibility: An assessment of the contribution of the UN Global Compact to CSR strategies in the telecommunications industry. *Journal of Business Ethics*. 84(4):479–495.

Sacquet, A.-M. 2002. *Atlas mondial du développement durable*. Ed. Autrement.

Sadler, B. 1996. *Environmental Assessment in a Changing World. Evaluating Practice to Improve Performance-final Report*.

Sadler, B. & Dalal-Clayton, D.B. 2012. *Strategic environmental assessment: a sourcebook and reference guide to international experience*. Earthscan.

Sagafi-Nejad, T. & Dunning, J.H. 2008. *The UN and transnational corporations: From code of conduct to global compact*. Indiana university press.

Sarrasin, B. 2006. The mining industry and the regulatory framework in Madagascar: Some developmental and environmental issues. *Journal of Cleaner Production*. 14(3):388–396.

Scannell, Y. 1995. *Environmental and planning law in Ireland*. Blackrock: Round Hall Press.

Schachter, O. 1991. The emergence of international environmental law. *Journal of International Affairs*. 457–493.

Schaltegger, S. & Burritt, R. 2017. *Contemporary environmental accounting: issues, concepts and practice*. Routledge.

Scheele, F., De Haan, E. & Kiezebrink, V. 2016. Cobalt blues. *SOMO Cent. Res. Multinatl. Corp*.

Schepers, D.H. 2011. The Equator Principles: a promise in progress? *Corporate Governance: The international journal of business in society*. 11(1):90–106.

Schiavi, P. & Solomon, F. 2007. Voluntary initiatives in the mining industry: do they work? *Greener Management International*. (53).

Schoenberger, E. 2016. Environmentally sustainable mining: The case of tailings storage facilities. *Resources Policy*. 49:119–128.

Schreurs, M.A. 2001. Why Governments Waste Natural Resources: Policy Failures in Developing Countries. *Political Science Quarterly*. 116(1):162–162.

Scotford, E. & Robinson, J. 2013. UK Environmental Legislation and Its Administration in 2013—Achievements, Challenges and Prospects. *Journal of environmental law*. 25(3):383–409.

Scott, D. & Oelofse, C. 2005. Social and environmental justice in South African cities: including 'invisible stakeholders' in environmental assessment procedures. *Journal of Environmental Planning and Management*. 48(3):445–467.

Scott Reeves, Ayelet Kuper and Brian David Hodges... - Google Scholar. n.d. [Online], Available: https://scholar.google.co.za/scholar?hl=en&as_sdt=0%2C5&q=Scott+Reeves%2C+Ayelet+Kuper+and+Brian+David+Hodges+%282008%29+Research%3A+Qualitative+Research+Methodologies%3A+Ethnography.+BMJ%3A+British+Medical+Journal%2C+Vol.+337%2C+No.+7668+%28Aug.+30%2C+2008%29%2C+pp.+512-514&btnG= [2019, April 18].

Seaman, C.E. 1995. Real World Research-A Resource for Social Scientists and Practitioner-Researchers. *British Food Journal*. 97(10):44.

Searle, J.R. & Willis, S. 1995. *The construction of social reality*. Simon and Schuster.

Secretariat, C. n.d. ICMM. 2009. *Minerals taxation regimes: A review of issues and challenges in their design and application: The challenge of mineral wealth: using resource endowments to foster sustainable development*.

Seebode, D., Jeanrenaud, S. & Bessant, J. 2012. Managing innovation for sustainability. *R&D Management*. 42(3):195–206.

Sekhar, R. 2002. *Ethical choices in business*. SAGE Publications India.

Sharma, P. 2008. Plastic waste-reduce, reuse and recycle of plastic waste s are essential to make the Environment Greener and Safer.

Shinn, D.H. 2016. The Environmental Imact of China's Investment in Africa. *Cornell Int'l LJ*. 49:25.

Shrivastava, P. 1995. The role of corporations in achieving ecological sustainability. *Academy of management review*. 20(4):936–960.

Silverman, D. 2015. *Interpreting qualitative data*. Sage.

Singh, R.K., Murty, H.R., Gupta, S.K. & Dikshit, A.K. 2012. An overview of sustainability assessment methodologies. *Ecological indicators*. 15(1):281–299.

Slack, K. 2012. Mission impossible?: Adopting a CSR-based business model for extractive industries in developing countries. *Resources Policy*. 37(2):179–184.

Smith, N.C. 2003. Corporate social responsibility: whether or how? *California management review*. 45(4):52–76.

Sobh, R. & Perry, C. 2006. Research design and data analysis in realism research. *European Journal of marketing*. 40(11/12):1194–1209.

Solomon, J. 2007. *Corporate governance and accountability*. John Wiley & Sons.

Solomon, F., Katz, E. & Lovel, R. 2008. Social dimensions of mining: Research, policy and practice challenges for the minerals industry in Australia. *Resources Policy*. 33(3):142–149.

Spratt, S. & Collins, L.R. 2012. Development finance institutions and infrastructure: a systematic review of evidence for development additionality. *Sutton: Private Infrastructure Development Group Trust*.

Squadrone, S., Burioli, E., Monaco, G., Koya, M.K., Prearo, M., Gennero, S., Dominici, A. & Abete, M.C. 2016. Human exposure to metals due to consumption of fish from an artificial lake basin close to an active mining area in Katanga (D.R. Congo). *Science of The Total Environment*. 568:679–684.

Stanard, M. 2014. Digging In: The Great War and the Roots of Belgian Empire. *Empires in World War One: Shifting Frontiers and Imperial Dynamics in a Global Conflict, Londres, IB Tauris*. 23–48.

Stanard, M. 2017. 'Boom! goes the Congo': The rhetoric of control and Belgium's late colonial state. In Manchester University Press *Rhetorics of empire*.

Stanard, M.G. 2014. Belgium, the congo, and imperial immobility: A singular empire and the historiography of the single analytic field. *French Colonial History*. 15:87–110.

Stanard, M.G. 2017. A Nervous State: Violence, Remedies, and Reverie in Colonial Congo by Nancy Rose Hunt. *Journal of the History of Medicine and Allied Sciences*. 72(2):236–238.

Stanard, M.G. 2017. *Dean Pavlakis. British Humanitarianism and the Congo Reform Movement, 1896–1913*. Oxford University Press.

Stanard, M.G. 2017d. Learning to love Leopold: Belgian popular imperialism, 1830–1960. In Manchester University Press *European empires and the people*.

Stead, J.G. & Stead, W.E. 2014. *Sustainable strategic management*. Routledge.

Stevenson, R. Ed. 2013. *International handbook of research on environmental education*. New York: Routledge.

Strauss, A. & Corbin, J.M. 1997. *Grounded theory in practice*. Sage.

Strydom, H.A. & King, N.D. 2009. *Environmental Management in South Africa*. Juta and Company Ltd.

Sumiani, Y., Haslinda, Y. & Lehman, G. 2007. Environmental reporting in a developing country: a case study on status and implementation in Malaysia. *Journal of cleaner production*. 15(10):895–901.

Suter II, G.W. 2016. *Ecological risk assessment*. CRC press.

Sutton, M.W., Weiersbye, I.M., Fourie, A.B., Tibbett, M. & Wiertz, J. 2007. South African legislation pertinent to gold mine closure and residual risk. *Mine Closure*. 89–102.

Sverdrup, H.U., Ragnarsdottir, K.V. & Koca, D. 2017. Integrated modelling of the global cobalt extraction, supply, price and depletion of extractable resources using the world6 model. *BioPhysical Economics and Resource Quality*. 2(1):4.

Szablowski, D. 2002. Mining, displacement and the World Bank: A case analysis of compania minera antamina's operations in Peru. *Journal of Business Ethics*. 39(3):247–273.

Szablowski, D. 2007. *Transnational law and local struggles: mining, communities and the World Bank*. Bloomsbury Publishing.

Takeuchi, K., Strongman, J.E., Maeda, S. & Tan, C.S. 1987. The world copper industry. *Its Changing Structure and Future Prospects, World Bank Staff Commodity Working Papers*. (15).

Tan, C. & Faúndez, J. Eds. 2017. *Natural resources and sustainable development: international economic law perspectives*. First edition ed. Cheltenham, UK: Edward Elgar Publishing.

Tarras-Wahlberg, N.H. & Nguyen, L.T. 2008. Environmental regulatory failure and metal contamination at the Giap Lai pyrite mine, Northern Vietnam. *Journal of environmental management*. 86(4):712–720.

Tarras-Wahlberg, H., Everard, M. & Harper, D.M. 2002. Geochemical and physical characteristics of river and lake [2pt] sediments at Naivasha, Kenya. *Hydrobiologia*. 488(1–3):27–41.

Tencati, A., Perrini, F. & Pogutz, S. 2004. New tools to foster corporate socially responsible behavior. *Journal of Business Ethics*. 53(1–2):173–190.

Tews, K., Busch, P.-O. & Jörgens, H. 2003. The diffusion of new environmental policy instruments 1. *European journal of political research*. 42(4):569–600.

Thyl De Lopez, T., Ponlok, T., Proeung, S., Sinoeun, C. & Thea, S. 2006. Towards sustainable development in Angkor, Cambodia: Social, environmental and financial

aspects of conserving cultural heritage. *EEPSEA research report series/IDRC. Regional Office for Southeast and East Asia, Economy and Environment Program for Southeast Asia; no. 2006-RR5*.

Tool, A. 2014. Wilhelm Dilthey (1833–1911). In *The Oxford handbook of process philosophy and organization studies*.

Tost, M., Hitch, M., Chandurkar, V., Moser, P. & Feiel, S. 2018. The state of environmental sustainability considerations in mining. *Journal of Cleaner Production*. 182:969–977.

Tourwe, T. & Mens, K. 2004. Mining aspectual views using formal concept analysis. In IEEE *Source Code Analysis and Manipulation, Fourth IEEE International Workshop on*. 97–106.

Trong Tuan, L. 2012. Corporate social responsibility, ethics, and corporate governance. *Social Responsibility Journal*. 8(4):547–560.

Tsurukawa, N., Prakash, S. & Manhart, A. 2011. Social impacts of artisanal cobalt mining in Katanga, Democratic Republic of Congo. *Freiburg: Öko-Institut eV, novembre*.

Tull, D. 2005. *The reconfiguration of political order in Africa: a case study of North Kivu (DR Congo)*. Vol. 13. GIGA-Hamburg.

Turker, D. 2009. Measuring corporate social responsibility: A scale development study. *Journal of business ethics*. 85(4):411–427.

Turner, M. 1997. *Governance, administration and development: Making the state work*. Macmillan International Higher Education.

Union, A. 2009. Africa mining vision. *AU, Addis Ababa*.

Union minière du Haut-Katanga Ed. n.d. *Haut-Katanga: revue du personnel de l'Union Minière du Haut-Katanga et de ses filiales*.

United Nations Environment Programme. International Resource Panel, United Nations Environment Programme. Sustainable Consumption & Production Branch. 2011. *Decoupling natural resource use and environmental impacts from economic growth*. UNEP/Earthprint.

University of Salford Institutional Repository. 2016. *University of Salford Institutional Repository - University of Salford Institutional Repository*. [Online], Available: http://usir.salford.ac.uk/ [2018, November 23].

Van Berkel, R. 2007. Eco-efficiency in the Australian minerals processing sector. *Journal of cleaner production*. 15(8–9):772–781.

Vanclay, F. & Esteves, A.M. 2011. Current issues and trends in social impact assessment. *New directions in social impact assessment: conceptual and methodological advances*. 3–19.

Verbruggen, D., Francq, E. & Cuvelier, J. 2011. Guide to current mining reform initiatives in Eastern DRC.

Verhoosel, G. 1997. Foreign Direct Investment and Legal Constraints on Domestic Environmental Policies: Striking a Reasonable Balance between Stability and Change. *Law & Pol'y Int'l Bus.* 29:451.

Vervaeke, A. 2013. " IT'S NOT MY STORY": THE DEVELOPMENT DISCONNECT BETWEEN CORPORATE SOCIAL RESPONSIBILITY AND THE NARRATIVES OF COMMUNITIES IMPACTED BY MINING IN PERU'S ANDES. PhD Thesis.

Vintró, C. & Comajuncosa, J. 2010. Corporate social responsibility in the mining industry: criteria and indicators. *Dyna*. 77(161):31–41.

Virah-Sawmy, M. 2015. Growing inclusive business models in the extractive industries: Demonstrating a smart concept to scale up positive social impacts. *The Extractive Industries and Society*. 2(4):676–679.

Virah-Sawmy, M. & Gardner, C.J. 2014. The Durban Vision in practice: Experiences in the participatory governance of Madagascar's new protected areas. In Routledge *Conservation and environmental management in Madagascar*. 240–276.

Virah-Sawmy, M., Ebeling, J. & Taplin, R. 2014. Mining and biodiversity offsets: A transparent and science-based approach to measure "no-net-loss". *Journal of environmental management*. 143:61–70.

Viveros, H. 2016. Examining stakeholders' perceptions of mining impacts and corporate social responsibility. *Corporate Social Responsibility and Environmental Management*. 23(1):50–64.

Vlassenroot, K. & Romkema, H. 2002. The emergence of a new order? Resources and war in Eastern Congo. *Journal of Humanitarian Assistance*. 28:24–39.

Vogel, S.K. 2018. *Freer markets, more rules: Regulatory reform in advanced industrial countries*. Cornell University Press.

Waas, T., Hugé, J., Verbruggen, A. & Wright, T. 2011. Sustainable development: A bird's eye view. *Sustainability*. 3(10):1637–1661.

Waddock, S. 2008. Building a new institutional infrastructure for corporate responsibility. *Academy of Management perspectives*. 22(3):87–108.

Wakenge, C.I. 2018. “Referees become players”: Accessing coltan mines in the Eastern Democratic Republic of Congo. *The Extractive Industries and Society*. 5(1):66–72.

Wan, P.M.J. 2014. Environmental justices and injustices of large-scale gold mining in Ghana: A study of three communities near Obuasi. *The Extractive Industries and Society*. 1(1):38–47.

Wanvik, T.I. 2016. Governance transformed into corporate social responsibility (CSR): New governance innovations in the Canadian oil sands. *The Extractive Industries and Society*. 3(2):517–526.

Ward, T. 2011. The right to free, prior, and informed consent: indigenous peoples’ participation rights within international law. *Nw. UJ Int’l Hum. Rts.* 10:54.

Warhurst, A. & Mitchell, P. 2000. Corporate social responsibility and the case of Summitville mine. *Resources Policy*. 26(2):91–102.

Warnaars, X.S. 2012. Why be poor when we can be rich? Constructing responsible mining in El Pangui, Ecuador. *Resources Policy*. 37(2):223–232.

Watchman, P.Q., Delfino, A. & Addison, J. 2007. EP 2: the revised Equator Principles: why hard-nosed bankers are embracing soft law principles. *Law and Financial Markets Review*. 1(2):85–113.

WBCSD, V. 2010. 2050 The new agenda for business. *World Business Council for Sustainable Development, Geneva*.

WCED. 1987. *World Commission on Environment and Development (1987)*. [Online], Available: https://public.wsu.edu/~susdev/WCED87.html [2018, September 17].

Weber, E.P. 2000. A new vanguard for the environment: Grass-roots ecosystem management as a new environmental movement. *Society & Natural Resources*. 13(3):237–259.

Weber, O. & Acheta, E. 2014. The equator principles: Ten teenage years of implementation and a search for outcome.

Weiblen, T. & Chesbrough, H.W. 2015. Engaging with startups to enhance corporate innovation. *California Management Review*. 57(2):66–90.

Welford, R. 2014. *Corporate environmental management 1: systems and strategies*. Routledge.

Welker, M.A. 2009. “Corporate security begins in the community”: mining, the corporate social responsibility industry, and environmental advocacy in Indonesia. *Cultural Anthropology*. 24(1):142–179.

Wickens, C.M. & Sandlin, J.A. 2007. Literacy for what? Literacy for whom? The politics of literacy education and neocolonialism in UNESCO-and World Bank–sponsored literacy programs. *Adult Education Quarterly*. 57(4):275–292.

Willard, B. 2012. *The new sustainability advantage: seven business case benefits of a triple bottom line*. New Society Publishers.

Williams, C.A. 2013. Regulating the impacts of international project financing: the Equator Principles. In Vol. 107. Cambridge University Press. 303–308.

Williams, C.A. & Conley, J.M. 2015. The social reform of banking. In Springer *Responsible Investment Banking*. 235–250.

Williamson, J. 2000. What should the World Bank think about the Washington Consensus? *The World Bank Research Observer*. 15(2):251–264.

Wills, B.A. & Finch, J. 2015. *Wills' mineral processing technology: an introduction to the practical aspects of ore treatment and mineral recovery*. Butterworth-Heinemann.

Wisner, B., Blaikie, P.M., Blaikie, P., Cannon, T. & Davis, I. 2004. *At risk: natural hazards, people's vulnerability and disasters*. Psychology Press.

Wong, S. 2012. What have been the impacts of World Bank Community-Driven Development Programs? CDD impact evaluation review and operational and research implications. *World Bank, Washington, DC*. 7.

Wood, S. & Richardson, B.J. 2006. Environmental law for sustainability.

Woods, N.D. 2013. Regulatory democracy reconsidered: The policy impact of public participation requirements. *Journal of Public Administration Research and Theory*. 25(2):571–596.

Worrall, R., Neil, D., Brereton, D. & Mulligan, D. 2009. Towards a sustainability criteria and indicators framework for legacy mine land. *Journal of cleaner production*. 17(16):1426–1434.

Wright, C. 2009. Setting standards for responsible banking: examining the role of the International Finance Corporation in the emergence of the Equator Principles. In Routledge *International Organizations in Global Environmental Governance*. 65–84.

Wright, C. 2012. Global banks, the environment, and human rights: The impact of the Equator Principles on lending policies and practices. *Global Environmental Politics*. 12(1):56–77.

Wudrick, H. 2015. Corporate Social Responsibility in the Canadian Mining Sector: Ethics, Rhetoric, and the Economy. PhD Thesis. Communication, Art & Technology:

Xu, Y. & Braune, E. 2009. *Sustainable groundwater resources in Africa: water supply and sanitation environment*. CRC Press.

Yakovleva, N. 2017. *Corporate social responsibility in the mining industries*. Routledge.

Yigitcanlar, T. & Teriman, S. 2015. Rethinking sustainable urban development: towards an integrated planning and development process. *International Journal of Environmental Science and Technology*. 12(1):341–352.

Yin, R.K. 2009. Case study research: Design and methods (applied social research methods). *London and Singapore: Sage*.

Young, C. 2015. *Politics in Congo: Decolonization and Independence*. Vol. 2313. Princeton University Press.

Young, I.M. 2011. *Justice and the Politics of Difference*. Princeton University Press.

Young, O.R. 2002. Institutional interplay: the environmental consequences of cross-scale interactions. *The drama of the commons*. 263–291.

Young, S.B. 2018. Responsible sourcing of metals: certification approaches for conflict minerals and conflict-free metals. *The International Journal of Life Cycle Assessment*. 23(7):1429–1447.

Zaelke, D., HUNTER, D. & SALzMAN, J. 1998. International Environmental Law and Policy. *NeW York*.

Zainal, Z. 2007. Case study as a research method. *Jurnal Kemanusiaan*. 5(1).

Zhang, K. & Wen, Z. 2008. Review and challenges of policies of environmental protection and sustainable development in China. *Journal of environmental management*. 88(4):1249–1261.

Zhengfu, B., Inyang, H.I., Daniels, J.L., Frank, O. & Struthers, S. 2010. Environmental issues from coal mining and their solutions. *Mining Science and Technology (China)*. 20(2):215–223.

Policies and Legislation

Democratic Republic of Congo Legislation

- Constitution of the Democratic Republic of Congo as revised by Law No. 11/002 of 20 January 2011 revising the Constitution of the Democratic Republic of Congo of February 18, 2006;
- Law No. 18/001 of 09 March 2018 amending and supplementing Law No. 007/2002 of 11 July 2002 on the Mining Code;
- Law no. 007/2002 of 11 July 2002 establishing the Mining Code;
- Decree no 038/2003 of 26 March 2003 establishing the Mining Regulations;
- Decree No. 068/2003 of 3 April 2003 relating to the creation, organisation and functioning of the mining cadaster, or 'CAMI'.
- Law no. 11-009 of 9 July 2011 regarding the fundamental principles for the protection of the environment;
- Law no. 015/2002 of 16 October regarding Labour code;
- Forest Code Law 011-2002 of 29 August 2002;
- Nature Conservation Law No. 14-003 of 11 February 2014;
- Law of 22 July 1975 regarding the Creation of Safeguarded Sectors;
- Ministerial Order 0001-71 of 15 February 1971;
- Decree of May 6, 1952 on the concessions and administration of water, lakes and rivers;
- Ministerial Decree n°0144/CAB.MIN/ 01/2013 of 17 April 2013 regarding the subcontracting of direct mining activities, related or ancillary activities of mining companies in the Democratic Republic of Congo.

- Inter-Ministerial Decree n°0122/CAB.MIN/MINES/01/2013and n°782/CAB.MIN/Finances/2013 of 05 April 2013. the regulation of export of mining merchant products;

- Inter-Ministerial Decrees No.0327/CAB.MIN/MINES/01/2013 and No.855/CAB.MIN/FINANCES/2013 of July 4, 2013 (new Decree) that amends and supplements the Inter- Ministerial Decree n°0122/CAB.MIN/ MINES/01/2013 and n°782/CAB.MIN/ Finances/2013 of 05 April 2013, on the regulation of export of mining merchant products;

- Ordinance of 1 July 1914 on the population and the contamination of sources, lakes, rivers and parts of watercourses;

- Ordinance 52-443 of 21 December 1952 sets down rules and regulations for the use of water sources, underground aquifers, lakes and rivers;

- Ordinance 64-650 of 22 December 1958 on the provisional measures of the inland waterway, engineering structures and port facilities;

- Ordinance 29-569 of 21 December 1958 provides regulations for irrigated crops with a view to protecting public health;

- Decree No. 038-2003 of 26 March 2003 on Mining Regulations;

- Order Law No. 71-016 of 15 March 1971 on the protection of cultural property;

- Mining Code of 2002 and the Mining Regulations of 2003;

- Labour Code Law No. 15-2002 of 16 October 2002;

- Departmental Order 78-004 of 3 January 1978 on the establishment of health and safety committees in companies;

- Ministerial Order No. 043 / CAB / MIN / ECN-EF / 2006 of 08 December 2006;

- Law 73-021 of 20 July 1973 on land, compensation and resettlement.

APPENDICES

Appendix B: List of Interview Question

Interview with the department of Environmental Affairs and Sustainable Development in the Katanga Province

Date of the interview:	Time:
Place:	
Name of Interviewee:	
Name and Initials of the Interviewer:	
Organization:	
Position:	
Language of the Interview:	

1. Overview of the mineral development in the Democratic Republic of Congo

1. Can you briefly describe your duties and responsibilities within the organisation?
2. What does 'sustainability' mean to you? a. Personal life, professional life; what ought it to be?
3. How important do you think is sustainable mining (socially, economically and environmental) ?
4. What are or have been the results and benefits from the implementation and application of environmental legislation in the country at national, regional and local level?
5. What form of training did you receive in order to promote environmental legislation in the mining sector?
6. What form of structure exists for collaboration between your department and other stakeholder to uphold environmental legislation in the mining sector?

2. Perception of the role of environmental legislation in the mining sector by the Public Sector

1. What do environmental legislations represent for you and your work/duties in relation to mining sector?
2. In your views what do you think are the strength and weakness of the current environmental legislations in relation to promoting sustainable mining?
3. Do you think the current environmental legislation promote sustainable mining? Explain your answer.
4. What areas of the current environmental legislation do you think need improvement in order to promote sustainable mining?
5. What are the challenges that you face in the accomplishment of your duties?
6. What are the mechanisms and tools that help you to uphold the environmental legislation in the mining sector?
7. What are the main challenges/problems you encounter in the application/upholding of the environmental legislation in the mining sector?
8. In your views do you think it possible to achieve sustainability in the mining sector through environmental legislations?
9. How does the current environmental legislation promote socio-economic development of the local population?
10. How are your working relationships with other stakeholders such as the mining companies, non-government organizations, provincial mining department, local population and non-government organisation?

3. Compliance to environmental legislations

1. What mechanisms exist to monitor compliance with environmental legislation and which parties are involved?
2. Has compliance been a challenge, and if so, how do you think it can be improved?
3. What are the most common reasons why mining companies struggle to promote sustainability in the mining sector in DRC and Katanga?
4. What roles do the following key stakeholders (individually and together) have to play in promoting sustainable mining in Katanga?

• Government (national or local), mining companies, NGO's

Interview with the department of Justice and Prosecuting Authority (National/Provincial)

Date of the interview:	Time:
Place:	
Name of Interviewee (optional):	
Name and Initials of the Interviewer:	
Organization:	
Position:	
Language of the Interview:	

1. Overview of the mineral development sector in Democratic Republic of Congo

7. Can you briefly describe your duties and responsibilities within the organisation?
8. What does 'sustainability' mean to you? a. Personal life, professional life; what ought it to be?
9. How important do you think is sustainable mining industry to the province and the country?
10. What form of structure exists for collaboration between your department and other stakeholder to promote sustainable mining?
11. Describe the working dynamics between your department and stakeholders involves in the application of environmental legislation (mining division, environmental division, mining companies and non-profit organisation)?

2. Enforcement of environmental legislation in the mining sector:

1. In order for penalties against those who do not comply with environmental legislation to yield a sufficient constraining effect, the enforcement institutions have to ensure a relatively high degree of certainty, swiftness and severity of it. In your opinion, how are those three criteria fulfilled in the application of environmental legislation in Katanga province?

2. Does the institution you work for experience any barriers in promoting sustainability in mining and enforcement of environmental legislation? If yes, what are the barriers?
3. What steps have been taken to overcome the barriers (by your institution and by other authorities)?
4. What do you think are the possible solutions of the issues that your institution experiences in promoting environmental legislation in the mining sector?
5. What are the mechanism in place to promote population right to clean and safe environmental and socio-economic development as stated in different environmental legislations Katanga province?
6. Are you aware of any obstacles that your services are facing in order to enforce and promote sustainable mining through proper implementation of environmental legislation? If yes, what are they?
7. What steps has your department taken to overcome these obstacles?
8. What do you think could be done to improve the enforcement of environmental legislation in DRC?

3. Perception of the role of environmental legislation in the mining sector

1. Do you think the current environmental legislation promote sustainable development?
2. In your views what do you think are the strength and weakness of the current environmental legislation in relation to promoting sustainable mining?
3. What areas of the current environmental legislation do you think need improvement in order to achieve sustainability in the mining sector?
4. What are the challenges that you face in the accomplishment of your duties?
5. What are the mechanisms and tools that help you to uphold the environmental legislation in the mining sector?
6. How does the current environmental legislation promote the right of the population to decent environment?
7. How does the current environmental legislation uphold/promote socio-economic needs of the local population?
8. How are your working relationships with other stakeholders such as the mining companies, non-government organizations, provincial mining and departments, local population and non-government organisation?

4. Compliance and monitoring of environmental legislations

5. What mechanisms exist to monitor compliance with environmental legislation and which parties are involved?
6. Has compliance been a challenge, and if so, how do you think it can be improved?
7. In your views, why do you think mining companies struggle in the application of environmental legislation and promotion of sustainable mining in DRC and Katanga?
8. What roles do the following key stakeholders (individually and together) have to play in promoting sustainable mining in Katanga?

• Government (national or local), mining companies, NGO's and local communities.

Interview with the department of Mineral affairs in the Katanga Province

Date of the interview:	Time:
Place:	
Name of Interviewee (optional):	
Name and Initials of the Interviewer:	
Organization:	
Position:	
Language of the Interview:	

1. Overview of the mineral development in Democratic Republic of Congo

12. Can you briefly describe your duties and responsibilities within the mineral department?
13. What does 'sustainability' mean to you? a. Personal life, professional life; what ought it to be?
14. How important do you think is sustainability for the mining industry in general?
15. Do you think there might be (socio-economic and environmental) negative impacts in the future if the mining sector continues to grow without sustainable development strategies?

16. What structure exists for collaboration between your department and other stakeholder to promote sustainability in the mining sector?
17. What form of training have you receive and provide to the rest of department agent in order to promote environmental legislation in the mining sector?

2. Perception of the role of environmental legislation for the promotion of sustainable mining

1. In your views what do you understand by environmental legislation?
2. In your views what do you think are the strength and weakness of the current environmental legislation in relation to promoting sustainable mining?
3. What areas of the current environmental legislation do you think need improvement in order to achieve sustainability in the mining sector?
4. What are the mechanism and tools that help you to uphold the environmental legislation in the mining sector?
5. What are the main challenges/problems you encounter in the application/upholding of the environmental legislation in the mining sector?
6. In your views do you think it possible to achieve sustainability in the mining sector through environmental legislations and how?
7. How can the current environmental legislation be improved in order to achieve sustainable development and sustainability in the mining sector?
8. How does the current environmental legislation promote the right of the population to decent environment?
9. How does the current environmental legislation promote socio-economic development of the local population?
10. How are your working relationships with other stakeholders such as the mining companies, non-government organizations, provincial mining department, local population and non-government organisation?

3. Process for Promoting Environmental Legislation in the Mining Sector

1. How are environmental Legislation promoted during mineral development agreements (or Arrangements) typically developed in DRC?

2. What principles and good practice guidance are applied?

3. How do legal and regulatory frameworks, relevant to civil and governance institutions, and mining companies interact to develop principles and good practice?

4. Do you think stakeholder engagement is working effectively in the mining sector in the country and Katanga province, and if not, how do you think this process could be improved?

5. What mechanism do you have in place to ensure that the mining sector contribute effectively to socio economic development of Katanga province?

4. Compliance to environmental legislation

9. What mechanisms exist to monitor compliance with environmental legislation and which parties are involved?
10. Has compliance been a challenge, and if so, how do you think it can be improved?
11. What are the most common reasons why mining companies struggle to promote sustainability in the mining sector in DRC and Katanga?
12. What roles do the following key stakeholders (individually and together) have to play in promoting sustainability in the mining sector in Katanga?

Government (national or local), mining companies, NGO's

Interview with Non-Government Organisation in Katanga Province

Date of the interview:	Time:
Place:	
Name of Interviewee (optional):	
Name and Initials of the Interviewer:	
Organization:	
Position:	
Language of the Interview:	

1. Overview of the Mineral Development Sector in DRC

1. Can you briefly describe your duties and responsibilities within the organisation?
2. What does 'sustainable mining' mean to you? a. Personal life, professional life; what ought it to be?
3. How important do you think is sustainability for the mining industry in general?
4. How does your organisation promote sustainable mining in the province of Katanga?
5. What the tools exist for your organisation to promote an effective implementation of environmental legislation for sustainable mining?

2. Perception of the role and implementation of environmental legislation

1. What are or have been the expected results and benefits from your action and intervention for the promotion and application of environmental legislation by your organisation?
2. Do you think there might be possible negative impacts (socio-economic and environmental) in the future if mining sector continues to grow without adequate application of environmental legislation?
3. What do you think of the current environmental legislation in relation to promoting sustainable mining in Katanga province?
4. What form of structure exists for collaboration between your organization and other stakeholder such as local community, mining companies and state institutions for the promotion of sustainable mining?

5. Describe the working dynamics between your organisation and other stakeholders involves in the application of environmental legislation (mining division, environmental division, justice division, mining companies)?
6. What kinds of training have you received or your service in order to promote the application and enforcement of environmental legislation in the mining sector?
7. How do you communicate environmental concerns to other stakeholders?
8. In your views do you think that the population is fully aware of their right to clean environment and what to do when a mining company does not comply with environmental legislation?
9. Do you think the mining companies are doing enough to develop and promote socio-economic development of your areas?
10. What mechanisms exist to monitor compliance with environmental legislation and which parties are involved?
11. Do you have any concrete example of mining company difficulties to apply environmental legislations?
12. What role do the following stakeholders (individuals or together) plays in promoting sustainable mining in Katanga? Government(national, local), mining companies and local communities

3. Compliances

1. In your opinion, what would be the best way to facilitate the implementation of environmental legislation for the promotion of sustainable mining? Depending on their answers – ask for reasoning for giving these responses E.g. if public sector should not be responsible – who should?
2. What are the main barriers to the implementation of environmental legislation in the province of Katanga?
3. Do you have any further comments about the importance of environmental legislation for the promotion of sustainable mining?
4. Do you think the public sector is doing a good job in their action of promoting sustainable mining in the province of Katanga? If yes/no could you provide examples!

Interview with Mining companies operating in the province of Katanga

Date of the interview:	Time:
Place:	
Name of Interviewee (optional):	
Name and Initials of the Interviewer:	
Organization:	
Position:	
Language of the Interview:	

1. Overview of the Mineral Development Sector in DRC

6. Can you briefly describe your duties and responsibilities within the organisation?
7. What does 'sustainability' mean to you? a. Personal life, professional life; what ought it to be?
8. What does sustainable mining means to you?
9. How important do you think is sustainability to the mining sector?
10. What form of structure exists for collaboration between your company other stakeholder to promote sustainability in the mining sector?
11. How does your company promote sustainability and sustainable mining in the province of Katanga?
12. What are or have been the expected results and benefits from the implementation and application of environmental legislation by your company?

2. Perception of the role of environmental legislation for the promotion of sustainable mining

1. Do you think there might be possible negative (socio-economic and environmental) impact in the future if mining continues to grow without adequate application of environmental legislation?

2. Describe the working dynamic between your company and other stakeholders involves in the implementation of environmental legislation (mining department, environmental department, justice department and non-profit organization) ?

3. How did you become aware of the relevant environmental legislation that applied to your activities?
4. How does the Environmental Policy apply to you and your work?
5. What procedures do you follow to implement and upheld environmental legislation?
6. Do you follow this procedure?
7. How does your work vary from the procedures?
8. What kind of environmental training have you received or provide to your employees in order to promote sustainable mining?
9. How do you communicate environmental concerns to management?
10. How would you respond to a stakeholder or local asking about environmental problems at this facility and your strategies for the promotion of socio-economic development of local communities?
11. In your views why do you think certain mining companies struggle to promote sustainable mining?
12. What roles do the following key stakeholders (individually and together) have to play in promoting sustainable mining? Government (national or local), mining companies, NGO's, local community

3. Compliance to environmental legislations

1. What mechanisms exist to monitor compliance with environmental legislation and which parties are involved?
2. Has compliance been a challenge, and if so, how do you think it can be improved?
3. In your opinion, what would be the best way to facilitate the implementation of environmental legislation for the promotion of sustainable mining? Depending on their answers – ask for reasons for giving these responses E.g. if public sector should not be responsible – who should?

4. Where do you get your ideas/strategies for sustainable mining practices? Importance of mining characteristics: Source of information, philosophy of owner, external consultants?
5. What is in your opinion/from your experience the main advantage of implementing sustainable mining practices?
6. What do you think are the main obstacles for better implementation of environmental legislation?
7. Do you have any concrete examples of problems you had encountered, or you are facing in the process of implementing sustainable legislation?
8. Do you have any further comments about your activities in relation to role of environmental legislation for the promotion of sustainable mining?

Interview with local communities/residents

Date of the interview:	Time:
Place:	
Name and Initials of the Interviewer:	
Language of the Interview:	
When did you move in this area:	
Why did move in this area:	

A. Overview of the mineral development sector in Democratic Republic of Congo

1. Do you think the mining companies operating in your area are doing enough to promote socio-economic development and protect your environment?

Yes	
No	

Elaborate more on your answer……

2. Do you think that mining companies are doing enough to mitigate possible socio-economic and environmental negative impact of their activities in your areas?

Yes	

No	

I yes/no explain why……
……..

3. Do you have knowledge of your environmental right? And what are they.

……
……..

4. How do you report any environmental disaster caused by mining activities to the relevant authorities?.....
.....

5. Are you aware of any possible negative impact of mining activities to your environment and socio-economic activities?

Yes	
No	

What are they?.....

6. Do you have any knowledge of environmental legislation in relation to promoting sustainable mining in Katanga province?

Yes	
No	

And how did you become aware?.....

7. What form of structure exists for collaboration between you (local communities) and other stakeholders (mining companies, state institutions and NGO's) to promote sustainable mining?

B. Compliance to environmental legislation

1. In your views do you think that the community is fully aware of their right to clean environment and what to do when a mining company does not comply with environmental legislation?

……
……
……
……..

2. Do you have/know any form of mechanisms to monitor compliance with environmental legislation by mining companies and which parties are involved?.....

3. In your views how compliances with the environmental legislation can be improved?.....
.....